WATER WORKS & SEWERAGE

Drawn by Dean Cornwell. Copyright 1940, U. S. Pipe & Foundry Co.

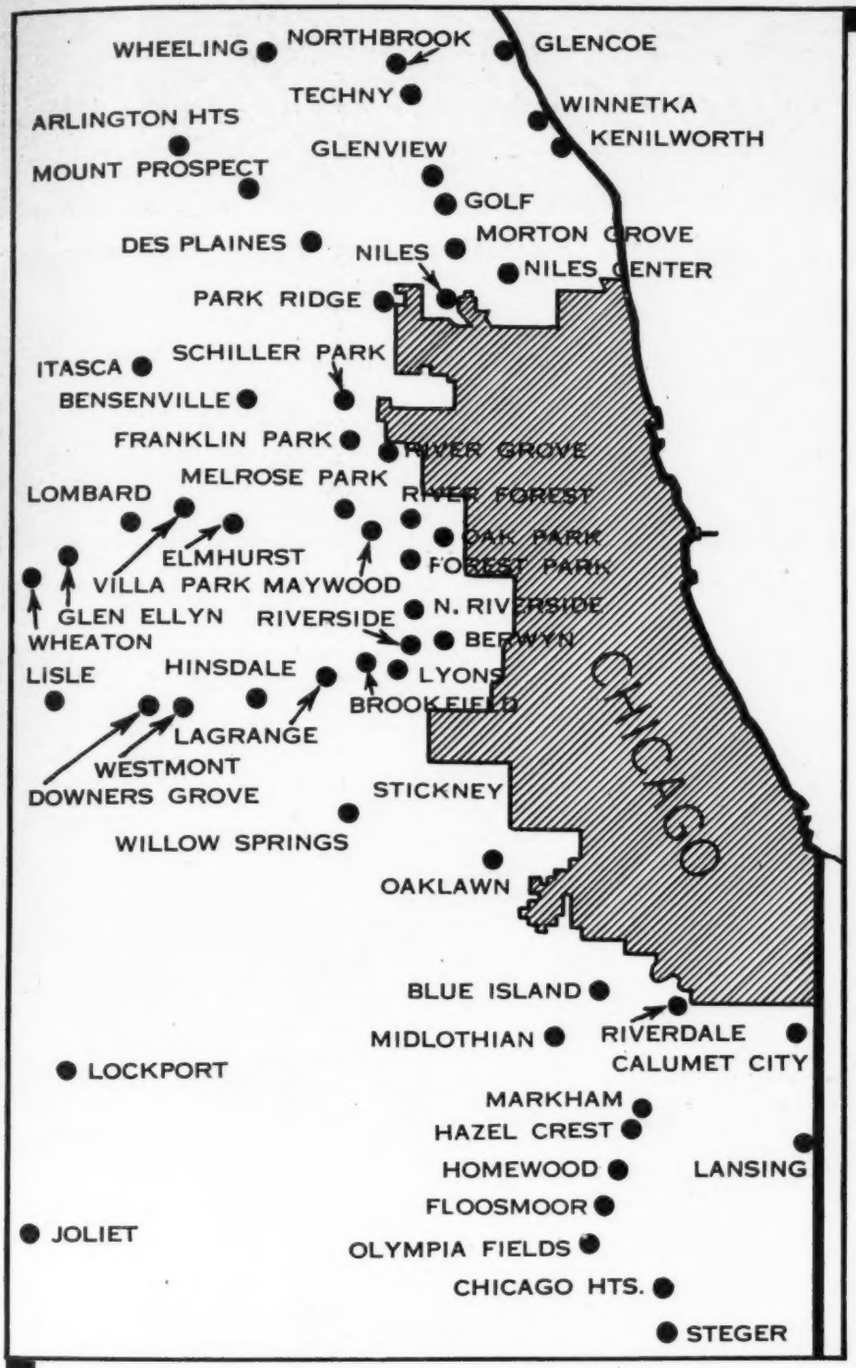
NEARLY everybody knows that cast iron underground mains give the best service for the longest period of time. "Best" service means trouble-free service. Long life, in the case of cast iron pipe, means a *century or more.* The result is lowest cost per service year. We manufacture Super-de Lavaud chill-free, centrifugally cast pipe and U. S. pit cast pipe. We have on hand for immediate delivery large stocks of pipe and standard fittings in plant and storage yards throughout the country.

U.S. cast iron PIPE

Centrifugally or Pit Cast for water works, gas, sewerage, drainage and industrial services.

U. S. PIPE AND FOUNDRY CO. General Offices: Burlington, N. J.

Plants and Sales Offices Throughout the U. S. A.



In and around Chicago

Clark-Sundh Water Works and/or Sewage Treatment Plant Control Apparatus operates in each of these municipalities in and around Chicago.

Dependable control is essential for reliable disposal of wastes, and for constant water supply—and Clark-Sundh apparatus—trouble-proof and dependable—furnishes this service.

Healthful living conditions with proper disposal of wastes are found in this Clark-Sundh protected area.

Adequate water supply for all uses, including fire protection, is supplied constantly, and Clark-Sundh Control plays an important part in this service.

Many other areas in the United States are also served by Clark-Sundh Sewage Disposal and Water Works Plant control apparatus.

There's a reason—for "3C" Engineers, trained in Electrical Control designing, bring years of experience to the solution of Water Works and Disposal Plant problems.

A folder describing many "3C" installations is yours for the asking, and our nearest office or agency is at your service.

OFFICES IN PRINCIPAL CITIES

THE CLARK CONTROLLER CO.

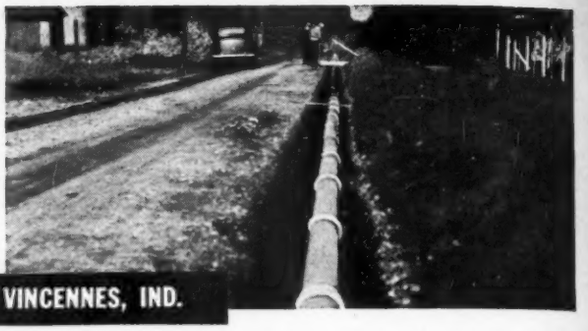
1146 EAST 152ND ST. CLEVELAND, OHIO

WATER WORKS & SEWERAGE, March, 1940. Volume 87. Number 3. Published monthly at 330 South Wells Street, Chicago, Ill., by the Gillette Publishing Company. Per copy, 25c. Subscription rate, United States and Canada, $2.00 per year; Foreign, $3.00 per year. Copyright, 1940. Entered as Second Class Matter, June 2, 1931, at the Post Office at Chicago, Ill., under Act of March 3, 1879.

For Greater Savings in

ARLINGTON, MASS.

One of hundreds of American municipalities where Johns-Manville Transite Pipe is providing highly efficient, low-cost water-transportation service.



VINCENNES, IND.

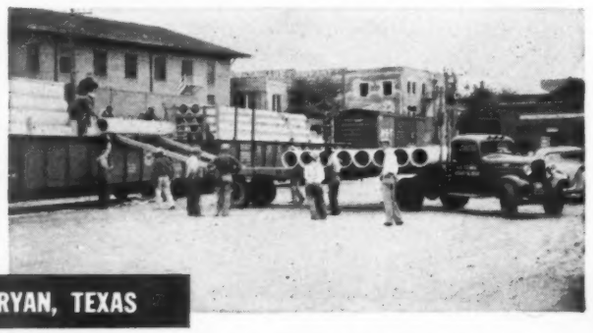
Transite, being non-metallic, can never tuberculate. Result: delivery capacity stays high throughout the system's long life . . . pumping costs remain low.

PORT HURON, MICH.

Transite's long lengths, light weight and ease of assembly speed up work even when unskilled crews are used . . . keep installation costs at a minimum.

SO. FALLSBURGH, N. Y.

Because Transite Pipe eliminates the need for large bell holes at joints, trenches can be narrower and more economical . . . damage to pavements is minimized.



BRYAN, TEXAS

Long, 13-foot sections of Transite Pipe reduce handling costs. Smaller trucks may be used, loading and unloading is faster—requires no mechanical equipment.

EVERGREEN PARK, ILL.

Transite's tough, asbestos-cement structure provides great durability and uniform strength . . . safely withstands heavy earth loads and soil stress.

EASTPORT, MAINE

The flexible Simplex Couplings used on Transite Pipe absorb traffic vibration . . . keep joints tight on this installation on a highway bridge.

EAST ORANGE, N. J.

Laid beneath city streets, J-M Transite Pipe provides maximum assurance of long life and unusually efficient, economical service with a minimum of maintenance.

Water-Transportation Costs

MORE AND MORE AMERICAN CITIES ARE TURNING TO

J-M TRANSITE PIPE

THE MODERN ASBESTOS-CEMENT WATER CARRIER

DELIVERY capacity up . . . maintenance and installation costs down —that's the story wherever Transite is laid. No wonder more and more engineers are specifying this better water carrier for every type of water line!

Check these brief facts yourself. Transite is an asbestos-cement product . . . strong, durable, unusually corrosion-resistant. Because it can never tuberculate, it maintains its high flow coefficient of C=140 indefinitely. Joint leakage is virtually eliminated by the flexible Simplex Couplings. Furthermore, Transite's light weight and long lengths plus the simple assembly method make important reductions in installation costs.

For full details on how you can increase efficiency and lower costs with J-M Transite Pipe, write for brochure TR-11A. And if you're interested in more economical sewage disposal, it will pay you to investigate J-M Transite Sewer Pipe. Send for brochure TR-21A. Johns-Manville, 22 East 40th Street, New York, N. Y.

• • •

BE SURE TO ATTEND the 60th Annual Meeting of the American Water Works Association, Kansas City, Missouri, week of April 21st, 1940.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANSITE PIPE

The MODERN Material for Water and Sewer Lines

COLUMBUS, OHIO

Made of asbestos and cement, Transite Pipe is exceptionally resistant to all forms of corrosive action . . . inside, outside and all the way through.

SAN FRANCISCO, CALIF.

On this Transite Pipe installation by the San Francisco Park Department, flexible Simplex Couplings permitted deflection at joints without leakage.

All Roads Lead

FOR THE SIXTIETH ANNUAL AMERICAN WATER

APRIL 21st to 25th, 1940

ALL MEETINGS will take place and the exhibits will be staged in the new Kansas City Municipal Auditorium which is conveniently located near the headquarters hotel.

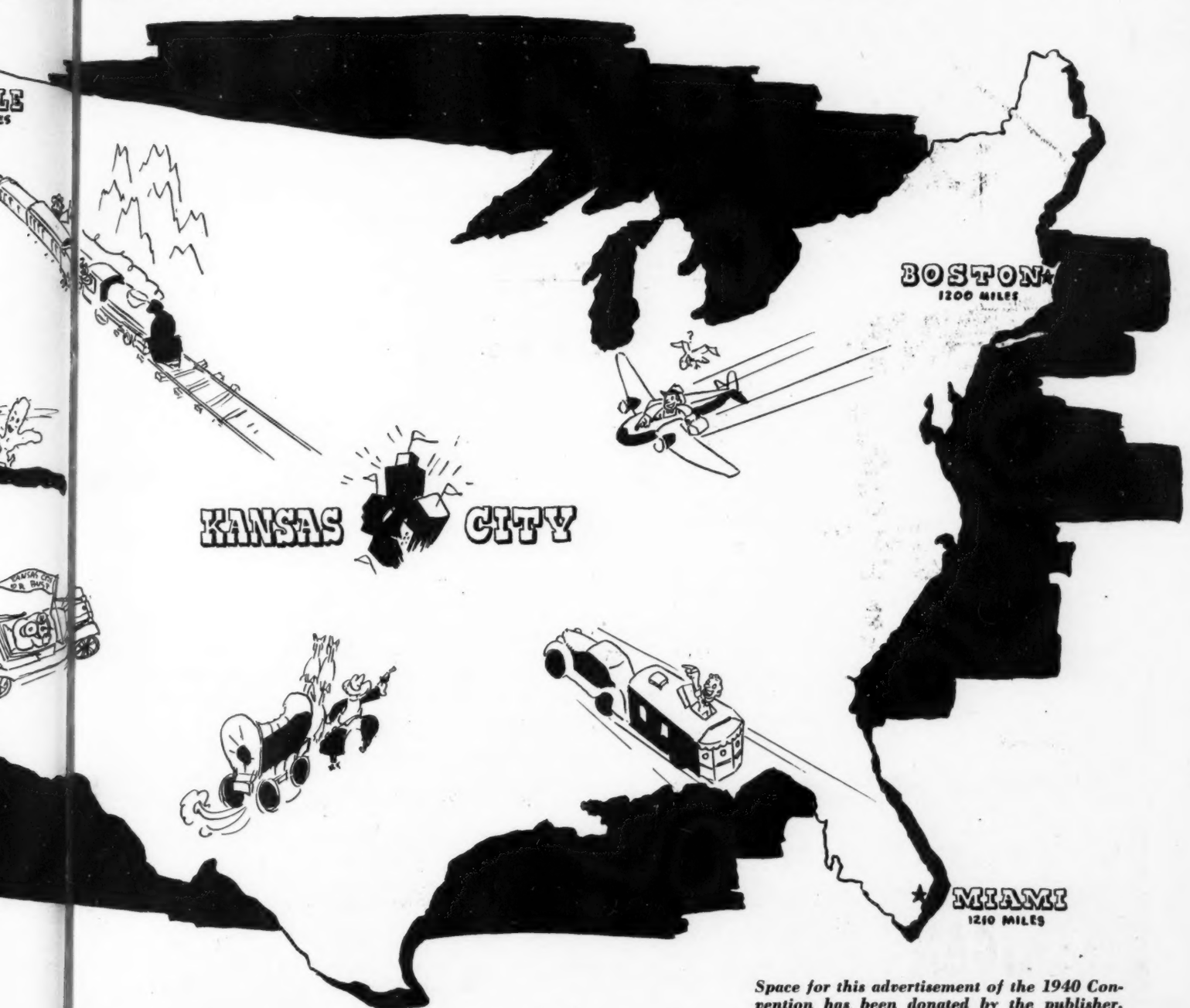
Both the program and the entertainment features are of outstanding interest, and the manufacturers' exhibits will be the finest and most complete in the history of the A.W.W.A. If you desire detailed information on any points in connection with this meeting please address.

AMERICAN WATER WORKS ASSOCIATION

22 East 40th Street New York

...al to Kansas City

...AL CONVENTION OF THE ...ER WORKS ASSOCIATION



Space for this advertisement of the 1940 Convention has been donated by the publisher.

WINSTON-SALEM *Improves Pressure with* THREE NEW ELEVATED TANKS

ABOVE: 50,000-gal. Horton ellipsoidal-bottom tank installed in the southern section of Winston-Salem.

CENTER: 38 ft. diam. radial-cone bottom tank, centrally located. It has a capacity of 1,000,000-gals.

LEFT, BELOW: 200,000-gal. radial-cone elevated water tank with 16½ ft. range, located in a northern section of the city.

WINSTON-SALEM, N. C., is making sure that its waterworks system will serve consumers well for years to come. With the completion of recent improvements, which included the three Horton elevated water tanks shown here, residents of this historical southern city now enjoy all the benefits available with efficient, up-to-date water suppy facilities.

The water system at Winston-Salem serves 95,000 people. Water requirements vary from 6 to 12 m.g.d., and pumping pressures range from 115 to 135 lbs. per sq. in. The purpose of the recent improvements was to replace old standpipes which had become inadequate, and to provide sufficient storage to regulate the pressure on the system, equalize the difference between the demand and supply and eliminate the necessity of operating additional pumps during peak demand periods. This particular situation serves as an example of how elevated storage helps to solve water supply problems. Let us discuss your storage requirements with you, without obligation. Address our nearest office.

Attend the A.W.W.A. Convention, Kansas City, April 21-25

CHICAGO BRIDGE & IRON COMPANY

Chicago . . . . . 2198 McCormick Bldg.	Birmingham . . . 1586 North 50th Street	Philadelphia . . . 1644-1700 Walnut St.
New York . . 3390-165 Broadway Bldg.	Tulsa . . . . . 1646 Hunt Bldg.	Boston . . . 1548 Consolidated Gas Bldg.
Cleveland . . . . . 2262 Rockefeller Bldg.	Houston . . . . . 2919 Main Street	San Francisco . . . . . 1083 Rialto Bldg.
Dallas . . . . . 1479 Liberty Bank Bldg.	Detroit . . . . . 1551 Lafayette Bldg.	Los Angeles . . . . . 1455 Wm. Fox Bldg.

***Plants at* BIRMINGHAM, CHICAGO, and GREENVILLE, PA.**
***In Canada:* HORTON STEEL WORKS, LIMITED, FORT ERIE, ONTARIO**

FOR CHLORINE USERS

• Valuable wall placard on "Handling of Liquid Chlorine"

HANDLING OF
LIQUID CHLORINE
Employee Protection
Leaks
What to Do in Case of Accidents
6 Locating Leaks—Wrap a rag on a stick and soak it in ammonia water and swab the suspected points. A white smoke will show the point of leak.

Pennsylvania Salt Manufacturing Company has just published, in durable wall placard form, 20 outstanding suggestions on the handling of liquid chlorine. These are based on the long and extensive experience of this Company with every phase of liquid chlorine handling and usage, and embody safety recommendations that are readily understood and easily followed.

The placard is handsomely printed, and illustrated in color, and is strongly backed with canvas. It is free to chlorine users upon request. It will promote safety in your plant.

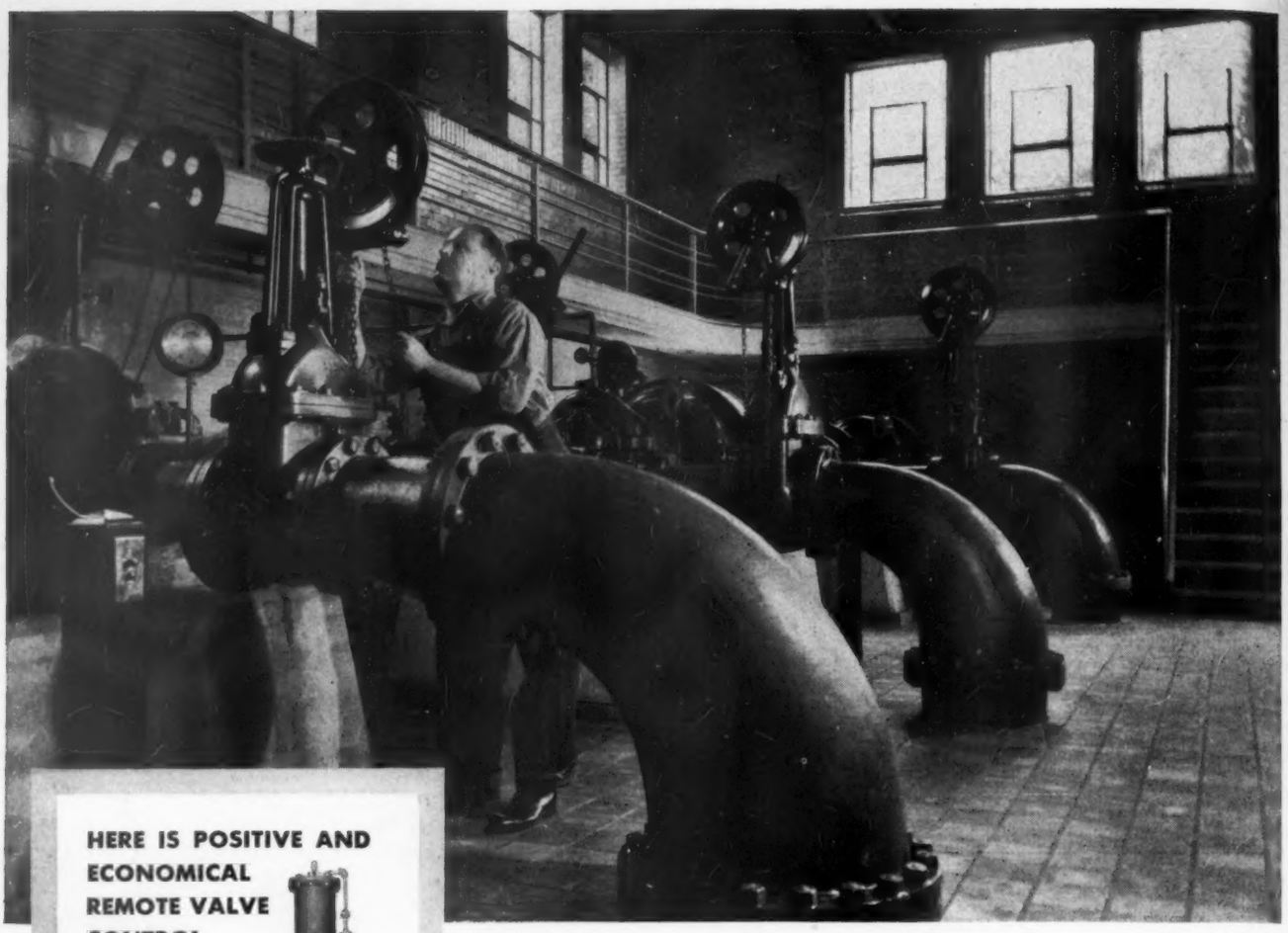
A new purifying process developed by Pennsylvania Salt Manufacturing Company produces a liquid chlorine which reduces chlorinator irregularities to a minimum. As a further safeguard, an improved analytical method has been developed for evaluating liquid chlorine as to such impurities. That is why you can rely so confidently on this product.

All containers in which this liquid chlorine reaches you are carefully cleaned and rigidly inspected before each shipment, and valves are always reconditioned and repacked. They look the part, for the handsome appearance of all containers is maintained with equal care.

If you are a user of liquid chlorine, be sure to write immediately for your free copy of the valuable wall placard. Pennsylvania Salt Manufacturing Company, Widener Building, Philadelphia, Pa.—New York • Chicago • St. Louis • Pittsburgh • Tacoma • Wyandotte.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

• Make your plans to attend the 60th Annual Meeting of the AWWA, Kansas City, Mo.



HERE IS POSITIVE AND ECONOMICAL REMOTE VALVE CONTROL

Cylinder operation is the logical choice for faithful response to central panel control. Why? Because cylinder mechanism is not dependent upon power supply which may be interrupted at an urgent moment. What's more, with hydraulic power readily available at the point of valve installation, its economical advantage is important.

The simple yet sturdy construction of Crane-perfected cylinder mechanism is most desirable for water works, filtration plants and sewage systems. Unexcelled in trustworthy performance, it is easily installed, easily maintained at constant efficiency.

Your Crane Representative can give you interesting facts about Crane valve-operating mechanisms of every practical type.

PRIDE OF THE VILLAGE

...Its Crane-Equipped Water Works

IN a village of beautiful homes and gardens on the shores of Lake Michigan, this water works provides adequate comfort for 15,000 people. Village-owned, with a capacity of 6 million gallons daily, it is a model plant of modern efficiency—the pride of the village!

The satisfaction of this community with its water works is matched by satisfaction with the Crane valves that control the flow of water at every stage of pumping and filtering.

Good performance, as well as the safety of your investment in valves lies principally in the proper selection of equipment for the job to be done. Crane, offering a complete line of soundly engineered valves, can assure dependable flow control at minimum cost—in every valve application. Whether you operate a water or sewage treatment plant—whether you need a big sluice gate or a small valve for a residential shut-off line, Crane can supply a valve that is designed to give you complete satisfaction in the service.

In the Crane No. 52 Catalog, there are listed more than 38,000 items that meet every flow-control requirement. Gain for yourself, and the people you serve, the distinctive advantages that Crane-Equipment brings to any piping system. Your Crane Representative is at your service.

1940 OUR 85th YEAR

CRANE

CRANE CO., GENERAL OFFICES
836 S. MICHIGAN AVE., CHICAGO

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

NATION-WIDE SERVICE THROUGH BRANCHES AND WHOLESALERS IN ALL MARKETS

Pure WATER

safeguarded the year 'round

with

DIAMOND

LIQUID CHLORINE

MUNICIPAL engineers everywhere have found that they can count on *Diamond* Liquid Chlorine. It never lets them down. It is always uniformly effective—always does the important job entrusted to it. And that's reassuring when human lives are at stake.

There are three sound reasons for the popularity of Diamond Liquid Chlorine. FIRST of all, there is its guaranteed purity. SECOND, Diamond's unique system of Controlled Manufacture assures unvarying uniformity. THIRD, Diamond's Scheduled Deliveries put your Liquid Chlorine at your door on scheduled time.

Standardize on Diamond, and rid yourself forever of worry and uncertainty about liquid chlorine. It is absolutely dependable — yet costs no more.

DIAMOND ALKALI COMPANY

Pittsburgh and Everywhere

VALUE

ACCURACY . . .

The Badger Meter Mfg. Company pioneered higher water meter accuracy standards.

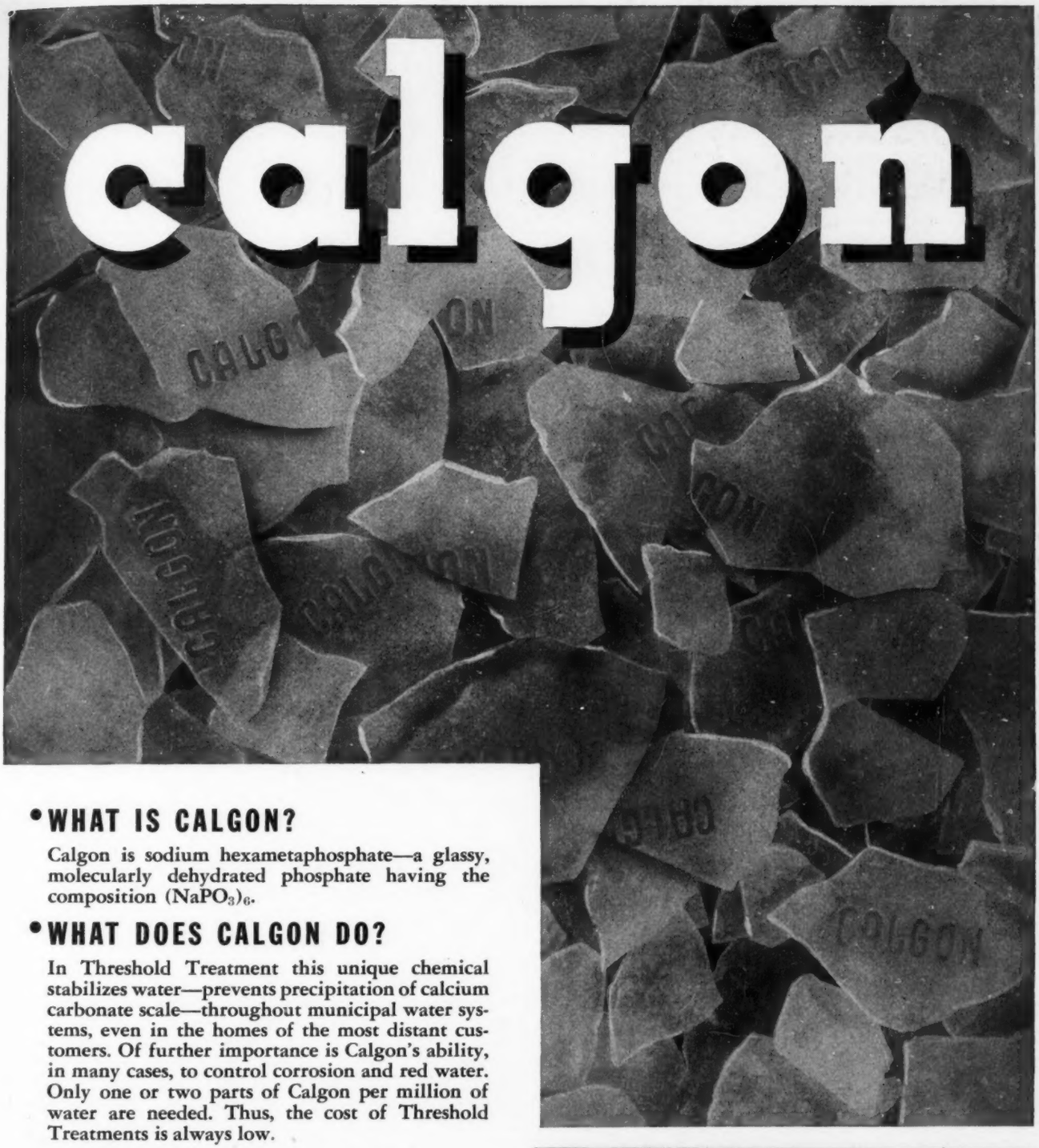
Constant improvements in equipment have been made each year to maintain this leadership . . . In specifying Badger Meters you are assured of greater accuracy.

BADGER METER MFG. CO.
MILWAUKEE, WISCONSIN

Branch Offices: New York City . . . Tampa, Fla. . . . Seattle, Wash. . . . Savannah, Ga. . . . Kansas City, Mo. . . . Marshalltown, Iowa . . . Los Angeles, Calif. . . . Chicago, Ill. . . . Waco, Texas . . . Philadelphia, Pa.

DURABILITY
DEPENDABILITY
SENSITIVENESS
LOW COST MAINTENANCE

BADGER *Water* METERS



•WHAT IS CALGON?

Calgon is sodium hexametaphosphate—a glassy, molecularly dehydrated phosphate having the composition $(NaPO_3)_6$.

•WHAT DOES CALGON DO?

In Threshold Treatment this unique chemical stabilizes water—prevents precipitation of calcium carbonate scale—throughout municipal water systems, even in the homes of the most distant customers. Of further importance is Calgon's ability, in many cases, to control corrosion and red water. Only one or two parts of Calgon per million of water are needed. Thus, the cost of Threshold Treatments is always low.

•WHO DEVELOPED CALGON?

Hall Laboratories, Inc., renowned authorities on water conditioning, developed Calgon—both in their own laboratories and through fellowships at eminent industrial and medical research institutions.

Each of Calgon's various applications, of which Threshold Treatment is one, has been a subject for continuous study and precise scientific elaboration. From these years of painstaking research, proved by practical field work, has come the new, unique tool for meeting your scale and corrosion problems —Calgon Threshold Treatment.

Already more than 80 municipalities are using Calgon. Send the coupon for complete information.

calgon, inc.
300 ROSS ST. PITTSBURGH, PA.

Gentlemen:
Please send complete information about Calgon for
☐ Scale prevention ☐ Control of corrosion.

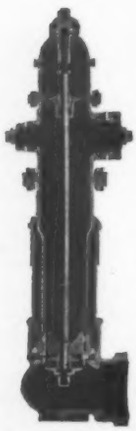
Name .....

Company .....

Address .....

WW&S-3-40

Say! Easy to open, easy to close even in sub-zero weather. I say "Specify Mathews" with its sealed-in operating threads.
Look! Full strength with no built-in breaking point! Yet it's as quickly repaired as any hydrant made. An advantage exclusive to Mathews Hydrants.
Hey! A "permanent hole!" Here's where you lift out all working parts to fix accidents, inspect valve seats, or make general overhauls.
The entire barrel, including all working parts, slips through a loose protection case and screws into the elbow. This assures protection against frost-heave, and allows quick removal for inspection, repair, or overhaul. Write for booklet.



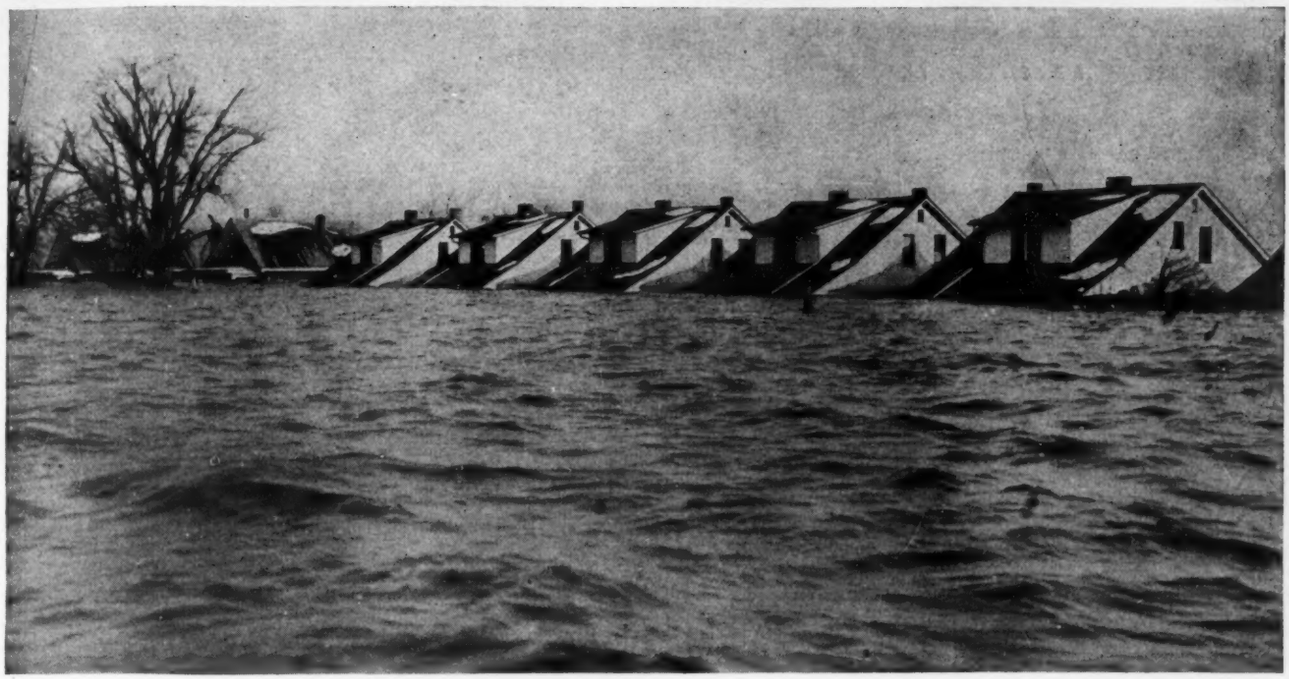
MATHEWS HYDRANTS

Made by R. D. WOOD COMPANY

Manufacturers of Sand Spun Pipe (centrifugally cast in sand molds) and R. D. Wood heavy-duty gate valves for water works

400 CHESTNUT STREET, PHILADELPHIA, PA.

FLOOD!



● Flood's quick destruction is followed by the even greater menace of polluted water supplies—epidemic disease. In hundreds of communities, HTH has proved invaluable in meeting such emergencies. It's so easy, with HTH, to apply chlorination promptly, on the spot, wherever pollution threatens. HTH contains 70% available chlorine, is quickly soluble in water, and because of its high concentration, an effective quantity can be transported quickly and easily wherever the threat of pollution is suspected and *before* that threat becomes a dangerous reality.

Receding flood waters also leave a pressing and vital sanitation problem. Flood areas must be cleaned up, disinfected, after the muddy waters have passed. Again, HTH comes to the rescue. Highly concentrated, quick-acting, easily soluble and easily transportable—it has proved ideally effective in combating flood's dangerous aftermath and restoring sanitary conditions.

In commoner emergencies, too, HTH is a boon. Broken water-mains, interrupted power supply, polluted wells, abnormal conditions due to fire—in any number of emergencies requiring quick, effective chlorination, HTH proves its worth.

Keep a supply of HTH always on hand—as so many waterworks do nowadays. HTH comes in handy for a multitude of everyday sanitation jobs—and prepares you to meet the inevitable emergencies with prompt efficiency.

Write or wire us for full information on HTH and your nearest source of supply.

Be Prepared with* HTH *for any emergency

THE Mathieson Alkali Works (INC)

60 EAST 42ND STREET, NEW YORK, N. Y.

LIQUID CHLORINE . . . HTH . . . SODA ASH . . . CAUSTIC SODA . . . BLEACHING POWDER . . . BICARBONATE OF SODA . . . AMMONIA, ANHYDROUS and AQUA . . . PH-PLUS FUSED ALKALI . . . DRY ICE . . . CARBONIC GAS

Remember this about

LEAKAGE

When rash statements are made about large losses from main leakage which are contrary to your experience, *cite the facts.* Leakage is only a part of unaccounted-for water. The generally accepted average of unaccounted-for water, throughout the nation, is about 15%. And that includes water used by the fire and sewer departments; water used for street flushing, for public buildings and other similar services. How much is due to leakage from cast iron mains? Read what follows:

* * * *

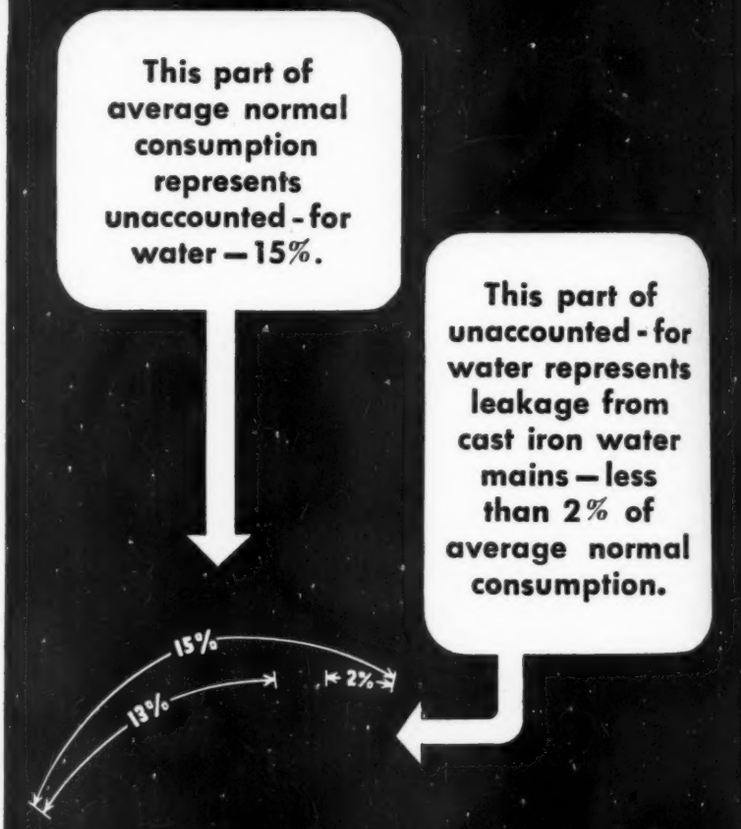
To ascertain how much of the 15% average of unaccounted-for water is actually due to leakage from water mains, we have recently conducted a leakage test survey of cast iron mains in 25 cities in various states. The mains tested range from several hundred feet to more than twenty miles in length, in sizes from 4″ to 30″ and up to 44 years old, either with no service connections or relatively few that were turned off during the tests. The average leakage per mile of pipe, per inch of diameter, per 24 hours was 41 gallons—or an average of 380 gallons per mile of pipe per day for the sizes tested. This leakage is less than 2% of the average of normal consumption per mile of distribution main per day. This survey, covering a broad average of water main construction and substituting facts for guesswork, shows that

less than one-tenth of all unaccounted-for water is due to leakage from cast iron water mains

THE CAST IRON PIPE RESEARCH ASSOCIATION
Thomas F. Wolfe, Research Engineer, 1015 Peoples Gas Bldg., Chicago, Illinois.

CAST IRON

Look for the "Q-Check" registered trade mark. Cast iron pipe is made in diameters from 1¼ to 84 inches.


This part of average normal consumption represents unaccounted-for water—15%.
This part of unaccounted-for water represents leakage from cast iron water mains—less than 2% of average normal consumption.
15%
13%
2%
NORMAL CONSUMPTION OF WATER

WATER WORKS & SEWERAGE

PUBLICATION OFFICE
330 South Wells Street, Chicago, Ill.
E. S. Gillette, Publisher

EDITORIAL OFFICE
155 East 44th Street, New York, N. Y.
L. H. Enslow, Editor

COMING!

Our April Issue—

Is to be the 1940 Reference and Data Issue, which has been for the past several years published as our Annual Water Works Convention Number. The feature of this issue is the appended Reference and Data Section, which is being repeated again to meet the wishes of 800 of our subscribers. These readers voiced their opinions in answering a questionnaire designed to guide us in determining whether or not to repeat this expensive issue. In consequence, the Reference and Data Section is to be revised and added to. It will appear bound with our April issue.

Grit—Its Collection and Washing

The finest group of papers ever presented on the problem of grit separation from sewage, and its subsequent treatment and disposal, were the three given before one of those highly productive meetings of the Sanitation Group of the Am. Soc. of Mechanical Engineers. All three of these meaty and up-to-the-minute papers, discussing modern grit handling methods and equipment, are to be grouped in our next issue. The authors—

W. A. KIVELL and N. B. LUND
The Dorr Co.

M. B. TARK
Link Belt Co.

R. D. NICHOLS
Jeffrey Mfg. Co.

Are You Watching Your "C" Line?

Is a discussion of the worth of keeping a track on the internal condition of arterial mains and the distribution system, and methods of doing so. The author contributes useful tables and graphs developed by himself for the purpose of avoiding arduous computations in determining friction coefficients ("C" in the Hazen-Williams formula) with sufficient accuracy for interim check-ups on the condition of mains and how the trend is going. The author stresses the worth of "Watching Your 'C' Line" and presents examples to illustrate use of the tables and graphs which he has found so helpful. The author—

D. R. TAYLOR, Plant Sup't.
Roanoke, Va.

Rejuvenating Cast Iron Mains

In Charleston, S. C., a fairly extensive project of cleaning and relining 12,000 ft. of old cast-iron distribution mains in place with cement-mortar by the Tate Process has been completed. Experiences, results and costs of this main rejuvenating project make interesting and profitable reading. Some of these mains had seen service since 1880. The author of this article is known as the "Father of Cement Lined Pipes" in America—

JAMES G. GIBSON, Sup't. & Manager
Charleston, S. C., Water Department

Packing Plant Waste Treatment

The method and plant of an important meat packing establishment involves multiple stage filtration. An innovation is the primary high-rate roughing (decolloidizing) filter, which is equipped for air and liquid back washing. Performance records add interest to the newness of the design and the method. The author—

L. R. HOWSON, Consulting Engr.
Chicago, Ill.

Metering and Meter Shop Practice

Needs no further explanation than the caption. The article comes from the Oklahoma City Water Department where many worthy practices and a modernly equipped meter shop is maintained. The author is—

M. B. CUNNINGHAM, Sup't. and Engr.
Oklahoma City Water Department

VOL. 87, No. 3 — March, 1940

CONTENTS

The Growing Importance of Industrial Waste Disposal..... 93
By F. W. MOHLMAN, Director of Laboratories, Sanitary District of Chicago, Editor, Sewage Works Journal

"Package Delivery" Waste Treatment Plants.....102
By E. B. MALLORY, Director of Research, Lancaster Iron Works, Inc., Hackensack, New Jersey

Michigan Upper Peninsular Water Operators' Conference...106

New Jersey Section, American Water Works Association....107

Porous Plate Filter Bottoms.....111
By LORAN R. STEVENS, Ford Motor Company, Flat Rock, Michigan

Air-Water Combination Wash.....114
By F. C. AMSBURY, Jr. Superintendent, Illinois Water Service Company, Champaign, Illinois

The New Treatment Plant of Hibbing.....115
By CHARLES FOSTER, Consulting Engineer, Duluth, Minnesota

New Jersey's Silver Anniversary Meeting.....119

Maine Water Utilities Association.....120

Modern Pioneers 124

New England Water Works Association.....125

Kansas City Convention Promises To Be a Hummer.....128

Complete Sewage Disposal for a Small Community.....130
By MORRELL VROOMAN, JR., Gloversville, N. Y.

Flexibility 134
By D. R. TAYLOR, Plant Superintendent Roanoke, Va.

A Simple Chlorine Deficiency Alarm.....135
By H. O. JOHNSON and F. M. JABLON

The Editor's Comments.....136

Equipment News .....Ad. Page 70

Manufacturers' News .....Ad. Page 76

Meetings Scheduled .....Ad. Page 78

Literature and Catalogs Received.....Ad. Page 79

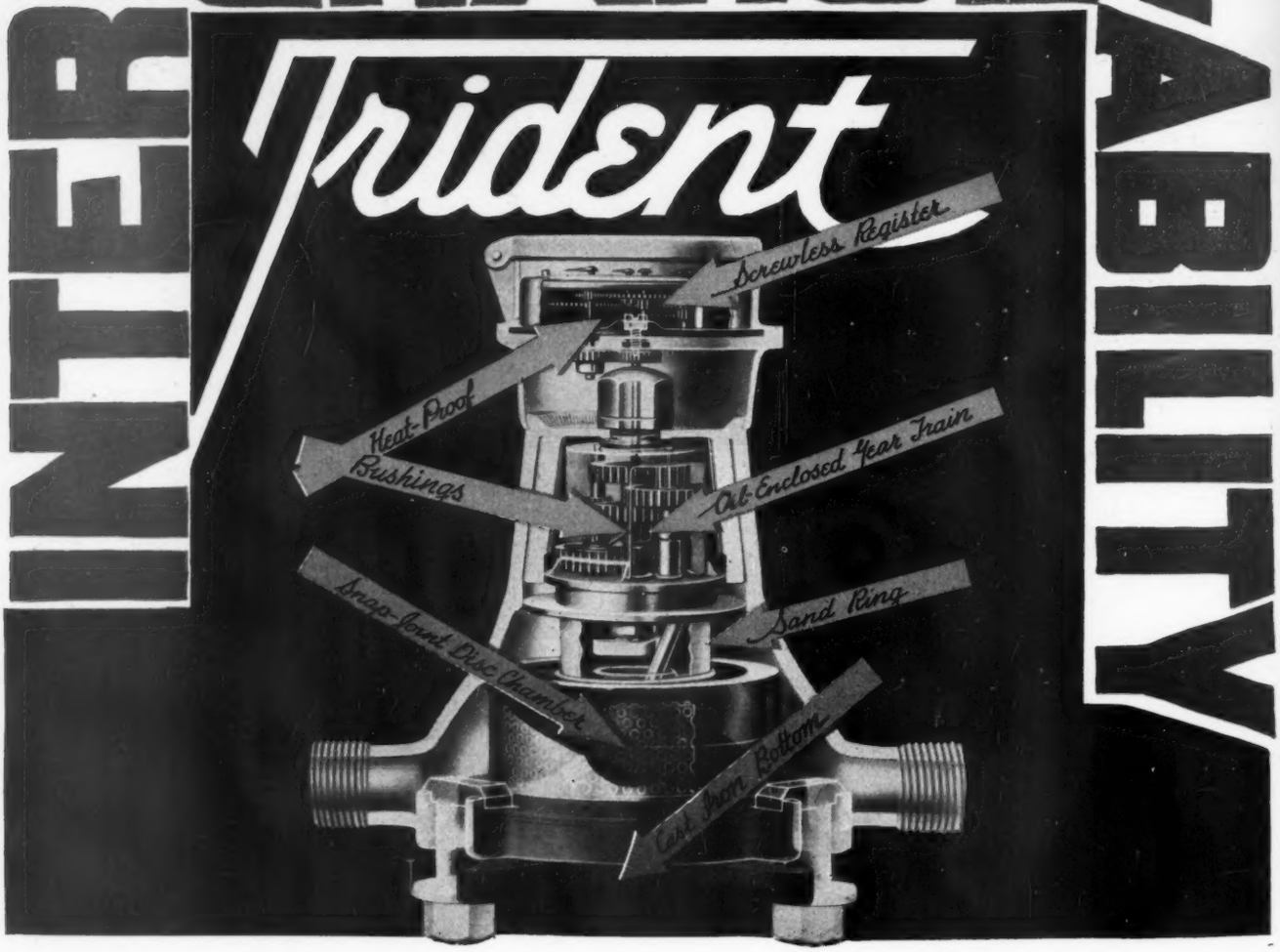
This Month's Cover— "The Mountain that Jack-Frost Built" is an appropriate caption for the picture on the cover. This interesting ice cone, 50 ft. high, is the result of a bursted water pipe at Bethlehem Junction, N. H. during one of the coldest spells of winter. (Photo by Pictures, Inc.)

H. P. GILLETTE, President; E. S. GILLETTE, Vice Pres. and Publisher; L. H. ENSLOW, Vice Pres. and Editor; JOHN C. BLACK, Managing Editor; Associate Editors — J. R. BAYLIS, A. M. RAWN, H. A. FABER; H. J. CONWAY, Make-Up Editor; D. G. LEDGERWOOD, Advertising Editor.

Chicago Office, L. H. Lingnor, Rep., 330 S. Wells Street. Cleveland Office, B. C. Brumm, Mg'r., 1217 St. Charles Avenue, Lakewood, Ohio. New York Offie, J. M. Angell, Jr., Eastern Mg'r., 155 East 44th Street. San Francisco Office, Don Harway, Rep., 155 Montgomery Street.

INTER-CHANGE-ABILITY

Trident



IN no other meter can you find ALL these basic features essential to accuracy, durability and general excellence.

Screwless Register . . . cuss-proof. Spring clips. No screws to rust or break.

Heat-proof Bushings . . . renewable hard rubber, eliminate trouble due to friction, corrosion.

Oil-Enclosed Gear Train . . . reduces wear, protects against corrosion and foreign matter.

Sand Ring . . . guards top of ball against grit and other debris.

Snap-Joint Disc Chamber . . . eliminates holding and locating screws. Spreads apart as water freezes.

Three-part Disc . . . can be adjusted to compensate for wear.

Roller Bearing-Plate . . . prolongs life of chamber. Silences operation.

Cast-Iron Bottom . . . breakable bottom prevents damage from freezing.

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WATER WORKS & SEWERAGE

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THE GROWING IMPORTANCE OF INDUSTRIAL WASTE DISPOSAL*

A Review of Developments in 1939

By F. W. MOHLMAN

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(Editor, Sewage Works Journal)

AN EXCITING prospect lies ahead in the field of industrial waste disposal.

The technical problems are more varied and complex than those that have been solved in the field of sewage treatment, and the cost of industrial waste treatment is likely to be as great as the cost of completing the sewage disposal projects of the nation. The National Resources Committee reported in 1939 that in order to bring about a reasonable abatement of water pollution it would be necessary to treat municipal sewage at a capital cost of $1,000,000,000, and industrial wastes at a capital cost of $900,000,000, plus $150,000,000 more for mine wastes and oil-field wastes. The estimates for industrial wastes are admittedly guesses in some instances, and the total is built up in rather lordly fashion from an itemized total of $494,000,000, but nevertheless the magnitude of the industrial waste problem is clearly demonstrated.

The Author

The costs for treating wastes from the major industries were estimated by a Special Advisory Committee as follows:

Foods, meats, beverages	$205,000,000
Paper and pulp	129,000,000
Textiles	54,000,000
Metals	42,000,000
Petroleum	30,000,000
Chemicals	28,000,000

The Committee reported that this program might require 10 to 20 years for completion, requiring a large amount of study and research to determine the most efficient methods of treatment for many wastes.

It is a little difficult to get down to cases after mentioning these large sums of money, but that is what must be done in the practical problems of industrial waste disposal to be discussed in this paper. A start has been made in treatment of wastes of many varieties, and as soon as the sanitary authorities become more concerned about the industrial waste situation, and more insistent that industries do their share in abating pollution, the treatment of wastes of all types will quickly follow. In order to be prepared for the day when money must be spent for treatment plants, the industrial executives should consider the feasibility of establishing a "Division of Losses and Wastes," and they should carry on a long-term program of gauging and analyses, so that they may, first, prevent losses of valuable products; second, have data on volumes and residual losses; third, know what is the most efficient and economical process of treatment for their wastes. Usually it will pay an industry to have a chemist or engineer with previous sanitary engineering experience in charge of this work, because he can interpret the results, from the standpoint of standards of treatment and disposal, more authoritatively than other types of engineers in the employ of the company. Some industries are already beginning to appreciate this fact.

Developments in 1939

Most of the work in progress on industrial wastes is of a confidential nature, and the results are rarely published, therefore one must rely on personal knowledge plus the limited published results of research for a review of current progress in the disposal of industrial wastes. However, interest is growing rapidly in these problems,

* Constituting Part 2 of a review of "Developments and Trends in the Disposal of Sewage and Industrial Wastes." Part 1, dealing with developments in the treatment and disposal of sewage, appeared in our February issue.—Ed.

and more is being published every year on industrial wastes. For example, the number of pages in the *Sewage Works Journal* devoted to industrial wastes have shown the following increase:

1936	21
1937	17
1938	96
1939	126

Waterworks and Sewerage has also stressed industrial waste disposal more and more from year to year, and adds emphasis to the important problem by featuring this review in an issue apart from that which featured developments and progress in disposing of municipal sewages. The meagre scope of the present review only emphasizes the feeble attack which has been made on the industrial waste problem to date.

One of the significant events of 1939 was the symposium on industrial wastes held at the September meeting of the American Chemical Society in Boston. The interest of the chemical industry in waste disposal was shown by the presentation of 12 papers, which dealt with the disposal of wastes from the textile industry, fermentation industry, iron and steel, paper, petroleum and chemicals, as well as the general and legal aspects of waste disposal. It is significant that all of these papers were published in *Industrial and Engineering Chemistry* for November, 1939, which represents rather prompt and conspicuous disposition by a leading publication in the industrial field.

Another interesting happening of 1939 was the attempt in England to interpret and apply the provisions of the 1937 Drainage of Trade Premises Act, which went into effect in the latter half of 1938. At Manchester, a very thorough appraisal of the provisions of the Act has been made by Mr. Porthouse, Secretary of the Corporation, and a schedule of charges has been drawn up, which will be mentioned later.

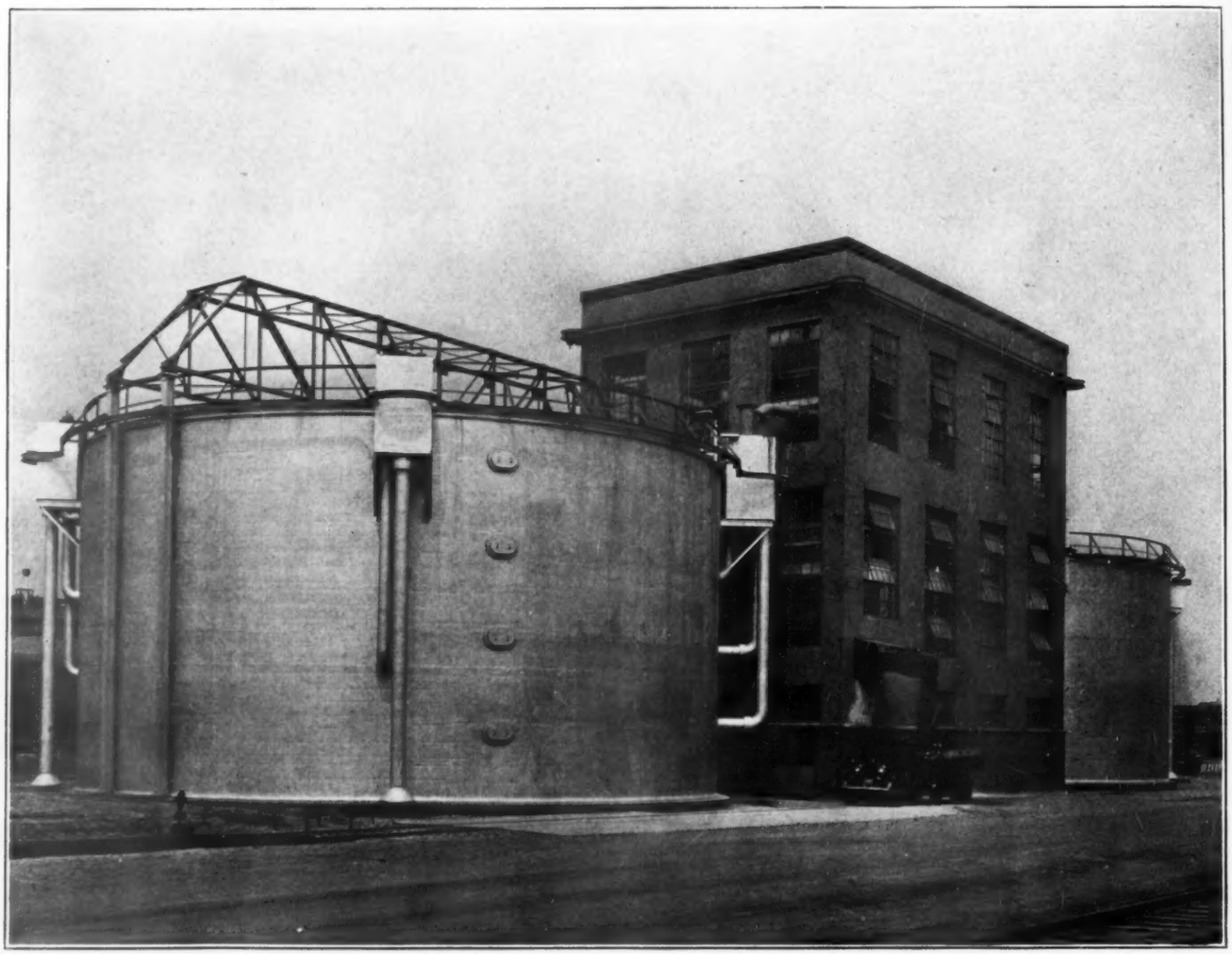
Treatment Progress

Various types of industries produce types of wastes as different as the industries themselves, and processes of treatment likewise produce variable degrees of purification.

Packinghouse and Stockyards Wastes

Packinghouse wastes are widely distributed and are usually large, concentrated sources of pollution. They have been studied widely in experiment stations and, in recent years, a number of full-scale plants have been put into operation. The tendency seems to be away from chemical treatment alone, although several plants are still operating with chemicals and others use chemicals in conjunction with biological processes.

Austin, Minn.: The Hormel plant, at Austin, Minnesota, has used the Halvorson chlorine-precipitation process for a number of years, but in 1939 experiments were undertaken with high-rate biological filters, of the type developed by Dr. Halvorson. Mr. Paul Hansen

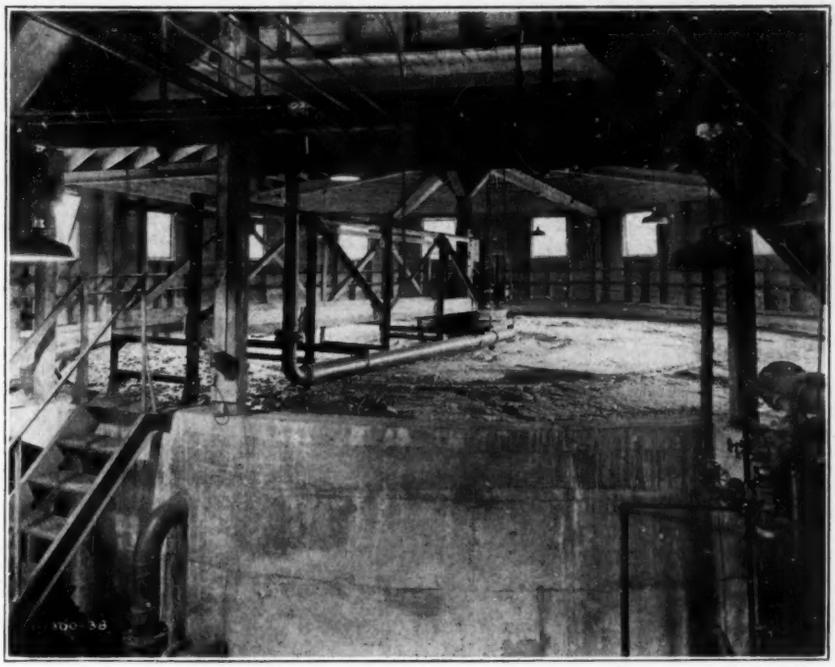


Waste Treatment Plant of Ford Motor Co.

Appearance of this plant and the twin Dorr Tray Type Clarifier-Thickeners is indicative of this company's policy.

has reported that the packinghouse officials are considering abandoning chlorination in favor of sedimentation and high-rate filtration, which gave about 70 per cent reduction of B.O.D. with threefold recirculation of the effluent. An agreement between th city and the packinghouse provides that the effluent discharged to the city sewers will contain less than 600 p.p.m. 5-day B.O.D. and 200 p.p.m. suspended solids. The final choice of treatment to effect this result will be determined on the basis of the economic relationship between the chemical and the biological method.

Cedar Rapids, Ia.: The packinghouse waste treatment plant of Wilson and Co. at Cedar Rapids, Iowa, was designed to use chemicals, but has not operated with them because of expense. In 1939 data were accumulated on the effect of flocculation without chemicals, but the tests were made on sewage containing a maximum of 20 per cent packinghouse wastes. Two-stage settling of these wastes was reported earlier to reduce the 5-day B.O.D. from 748 to 478 p.p.m., a reduction of 36 per cent, and of suspended solids from 560 to 141 p.p.m., a reduction of 75 per cent.



Treating Wastes from Rubber Reclaiming Plant

The Dorr Center Feed Clarifier has well paid for itself in rubber recovered at the plant of Goodyear Tire and Rubber Co.

Phoenix, Ariz.: The Tovrea Packinghouse at Phoenix was reported in 1939 to be using ferric chloride made from baling wire and chlorine for precipitation of the wastes, using 300 lb. wire and 350 lb. chlorine per day for 300,000 gallons flow. The B.O.D. was stated to be reduced from 1448 to 188 p.p.m. (87 per cent) and suspended solids from 2975 to 167 p.p.m. (94 per cent). Cost of iron and chlorine averaged 2.5 ct. per lb. of $FeCl_3$ produced. The operating costs were $68 per m.g. but credit of $43 per m.g. was claimed for value of grease, sludge, gas, and effluent used for irrigation.

Madison, Wis.: Chemical treatment was still in use during 1939 at the Oscar Mayer plant in Madison. The process was installed following experimental work by Dr. Domogalla, who has patented the procedure. Strong wastes are treated by a mixture of zinc chloride and alum and settled. Zinc chloride was chosen because it is a very effective precipitant of proteins. The first stage effluent is treated with lime and again settled. The effluent is remarkably clear although straw colored. The B.O.D. is reduced from approximately 1600 to 200 p.p.m., and the suspended solids from 1200 to 80 p.p.m. Sludge is treated with lime, filtered on a vacuum filter, and dumped.

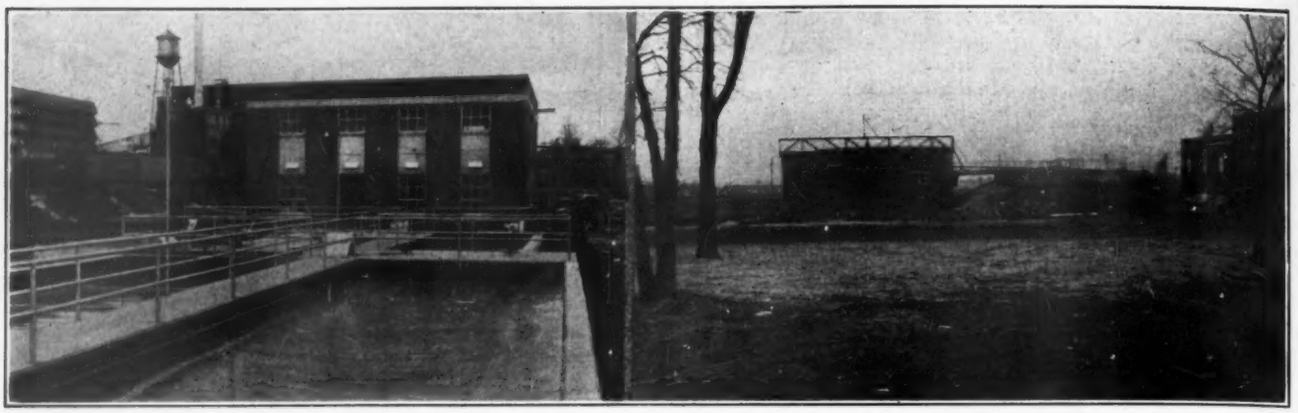
Muncie, Ind.: Activated sludge treatment of moderately strong packinghouse wastes has given excellent results at the Kuhner plant in Muncie, Indiana. The B.O.D. reduction has been reported to be from 758 to 9 p.p.m. and suspended solids from 708 to 18 p.p.m. Longer term tests are desirable to demonstrate whether these high efficiencies are maintained continuously. The aeration period is quite long, ranging from 11 to 22 hours.

Mason City, Ia.: Activated sludge treatment originally installed at the Decker plant (now Armour & Co.) in Mason City, Iowa, proved quite unsuccessful because of a greatly increased kill, wide fluctuations in strength and character of wastes, and clogging of diffuser plates. The problem was studied by Dr. Max Levine and Harry Jenks. Experimental work on biological filtration was undertaken, and in 1933 a full-scale plant was put into operation, consisting of 2 hours pre-sedimentation, first-stage filtration through a washable filter, 4 ft. deep of 2 in. stone, followed by settling, and second-stage filtration through ½ acre of an 8 ft. filter of 1 to 3 in. dolomite, and final sedimentation. The primary filter in which the waste is "de-colloidized" to a considerable extent is washed about twice per week. It has shown some clogging. The B.O.D. is reduced from approximately 600 p.p.m. to 20 p.p.m. Sludge is lagooned.

West Fargo, N. D.: The Mason City plant has led to recent installation of other works of this type. The West Fargo plant of Armour and Co. has been in operation since March, 1938. It includes mechanical flocculation for 40 minutes, which increases the B.O.D. removal by 5 per cent, primary settling, four washable filters each 42 ft. in diameter and 6 ft. deep, a clarifier, two final filters, each 120 ft. in diameter and 6 ft. deep, and a final settling tank. Mr. L. R. Howson, designer of the plant, reports 65 to 70 per cent reduction of B.O.D. through the washable filters, which are operated at 6 m.g.a.d., and an overall reduction of more than 95 per cent by the final filters, operated in parallel at 1.4 m.g.a.d. The plant was designed for a flow of 700,000 gallons per day. [The plant is the subject of an article by L. R. Howson, scheduled to appear in the April issue of this magazine.]

South St. Paul: Other new plants of the Levine type are under construction at South St. Paul for Armour and Swift packinghouses, and under design for the Cudahy plant. Only the primary stage of filtration (a form of bio-precipitation) has been included. These plants are outside the Minneapolis-St. Paul Sanitary District, but the first two will also include the municipal sewage from the small community of South St. Paul.

Preliminary clarification of packinghouse wastes has been practiced for some years at Ft. Worth and Sioux Falls. At other places, packinghouse wastes are treated with large volumes of sewage. This is to be done at Chicago, for the largest concentration of packinghouse and stockyards wastes in the world. A survey of the wastes



Packinghouse Waste Treatment Plant of Oscar Mayer Packing Co. at Madison, Wisc.
(Left)—Flocculating and settling units equipped with Rex Flocculator and Sludge Collectors; (Right)— Steel Sludge thickening tank equipped with "Tow-Bro" type Sludge Collector.

from 41 plants was made in 1935. The total suspended solids averaged 75 tons (dry) per day and the B.O.D. was equivalent to that of nearly 1,000,000 people.

At Oklahoma City packinghouse wastes are discharged to the city sewer, chlorinated to retard biological action and hydrogen sulfide production and given chemical precipitation treatment at the city's treatment works.

Paying the Cost of Treatment

The cost of chemical or biological treatment of packinghouse wastes where plants must treat undiluted wastes, as at Madison, Austin, West Fargo, or South St. Paul, is borne entirely by the industry. In cities where raw or settled wastes are treated along with city sewage, a reasonable proportion of the cost of treatment should be borne by the industry. The most reasonable basis of evaluating such cost should take account of flow, suspended solids and B.O.D., with costs allocated to the units of the plant whose operation is affected by the magnitude of these factors. No single one of the three factors is a fair criterion of the cost, but a properly weighted total is logical and fair.

Brewery Wastes

The recent survey of industrial wastes in Chicago gave some rather surprising data with reference to brewery wastes. A total of 28 breweries produced a population equivalent of 210,000 based on B.O.D., second only to packinghouses, and greater than all tanneries or any other single type of industry. Apparently the wastes from breweries have been overlooked as a large source of pollution load at sewage treatment works. The B.O.D. loss at Chicago was as much per ton of beer brewed as per ton of animals killed at packinghouses, a truly surprising revelation. At Munich, Stecher reported that brewery wastes accounted for a population equivalent of 186,000 as compared with the human population of 703,000. A barrel of beer produces wastes whose B.O.D. is equivalent to the sewage of approximately 20 persons. The sales of beer in the U. S. in 1938 were 51,360,000 barrels, or 141,000 barrels per day, equivalent to a population of about 2,800,000. [Fortunate is St. Louis that it has the "Father of Waters" running past its door. Not so fortunate were San Antonio and Indianapolis where the activated sludge plants had to stand the brewery waste load, which converted these plants into "foam factories" for a time.—Ed.]

Brewery wastes at Chicago average around 1200 p.p.m. B.O.D., 600 p.p.m. suspended solids, and 50 p.p.m. total nitrogen. They are produced mainly from yeast residues, keg and bottle washings and, particularly, spent grain liquors. There is no doubt that much valuable stock food material goes down the sewers, but because of the many small breweries and because of the lack of interest of the Brewers' Research Institute, not much has been done to prevent or reduce the losses.

Usually brewery wastes are treated with sewage at the sewage treatment works. A treatment plant for brewery wastes alone has been built and is operated by the Gulf Brewing Co. at Houston, Texas. This consists of two settling tanks providing 1.5 hours detention, two filters each 100 ft. in diameter by 6.5 deep, and one final settling tank. Sludge is digested and dried on sand beds. Experimental work indicated that filters would accomplish up to 90 per cent reduction of B.O.D., as compared with only 65 per cent by use of chemicals. The wastes treated average about 500,000 gallons per day, with a B.O.D. of 795 p.p.m. and suspended solids 371 p.p.m.

The wastes from a small brewery at Shepley, Yorkshire, are reported by Garner to be treated first with 100 grains per gallon of lime, allowed to settle over night, and applied to two trickling filters in series. The wastes are concentrated (only 3 times volume of beer brewed, as compared with a ratio of 10 to 12 at Chicago and Houston) and the total volume of wastes is only 10,000 Imp. gal. per day.

Malt wastes are comparatively weak and easy to treat. Trickling filters seem well adapted for treatment, following screening to remove barley grains.

Yeast and Distillery Wastes

Yeast and distillery wastes are similar in composition and concentration. They are much more concentrated than brewery wastes and nearly all of the organic matter is in solution. [These wastes, warm and high in sulphates, have resulted in sewer destruction due to rapid hydrogen sulphide production after entering the municipal sewer system.—Ed.]

General methods of treatment of yeast and distillery wastes are either aerobic, comprising dilution and high-rate trickling filters, or anaerobic fermentation, followed by biological filtration. If the wastes can be kept concentrated to approximately 3.0 per cent solids, they can be evaporated after being screened, centrifuged or filtered. The Hiram Walker plant at Peoria uses centrifuges to remove more of the insoluble solids than can be removed by screens, thus permitting evaporation to 50 per cent solids in multiple effect evaporators, which are low in operating cost, whereas if only screened these wastes can

obtained has just been published in the Annual Report of the Water Pollution Board for the year ending June 30, 1939. The results have not been as good as expected, but the experiments are continuing. It is interesting to note that this is one case where treatment of industrial wastes has led to study of a similar process for treatment of sewage.

Textile and Dye Wastes

Much experimental and full-scale work is under way on the abatement of pollution by textile and dye wastes. Porges for the Textile Foundation has studied methods for treatment of textile wastes in North Carolina; Hoover has described plants in Connecticut; Weston has had wide experience with wool washing wastes in Massachusetts; a plant for disposal of dye wastes is under construction at Bound Brook, N. J.; similar wastes have been eliminated at a dye plant in Buffalo. At Durham, N. C., Phillips has successfully digested the very difficult wastes from the boiling kiers along with sewage solids in experimental digesters. This scheme of disposal of the "problem child" of textile wastes is reported to appear to be an entirely feasible one, and provides additional gas for power generation. The problem is that of transporting the concentrated waste to the sewage treatment plant. Definite progress is therefore being made in abatement of pollution by these complex and refractory wastes.

Paper and Pulp Wastes

It is hardly necessary to emphasize the importance of paper and pulp wastes. In the National Resources Committee Report, previously mentioned, these wastes are second only to all food, meat and beverage wastes, and account for a suggested capital expenditure of 129 millions out of a total of 494 millions.

Paper mill wastes contain mainly paper fibres in suspension, which can be removed by sedimentation, flotation, filtration or centrifuging. Sedimentation has been used to about the limit of its applicability, centrifuges do not have the capacity to handle such large volumes, which leaves filters and flotation as possibilities for further clarification of "white water." The new flotation processes (Adka and Sveen) are of particular interest. Air, alum, sulfonated oils, glue, etc., are used, with aeration, to float fibers which will not settle. In most cases the recovered fiber can be returned to the process and reused. Remarkable results are reported by these methods, with effluents containing only 20 p.p.m. suspended solids.

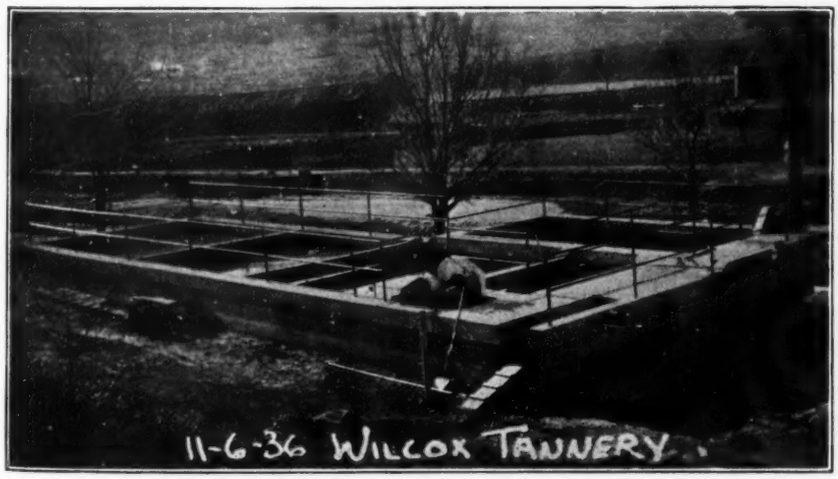
Warrick has reported at length on paper mill losses, and has waged a long campaign in Wisconsin to improve practice. Losses have been reduced, and good operation now requires fibre loss of less than 1 per cent of the weight of paper manufactured.

Pulp production wastes are quite another story. The processes—sulfite, sulfate, soda and ground wood—are well known, particularly the first. Sulfite wastes undoubtedly take first place of all industrial wastes with reference to study, patents, attempts of utilization and problems still remaining. Even in Europe no process has been perfected, whereas in this country we have had the Howard Process in operation at the Marathon Mills in Rothschild, Wis., for a number of years. Briefly, in this process lime is used in three stages, first to remove SO_2 as calcium monosulfite, second to precipitate lignin for use as fuel or for manufacture of by-products, and third to remove as much remaining organic matter as possible. Vanillin, activated carbon, a tanning extract, plastic products and other products are made from the recovered solids. Unfortunately the effluent contains most of the sugars and 20 to 30 per cent of the lignin originally present, so the reduction of B.O.D. is not very great; tests by Warrick, reported in 1939, showed from 31 to 43 per cent reduction. This is probably all that might be expected by use of lime on a waste in which so much of the organic matter is in solution. Further tests are to be made in Wisconsin on the Howard Process.

For many years the paper industry has had an outstanding research institute at Appleton, Wisconsin, in which innumerable problems of paper manufacture and use have been investigated, but practically no thought or money has been devoted to waste prevention or alleviation. Recently, however, the Institute has undertaken a program of investigation of waste disposal, and it may lead to new processes for treatment of pulp and paper wastes. The encouraging thing is that this leading trade institute has at last recognized the necessity of studying waste problems along with production problems.

Tannery Wastes

Wastes from tanneries combine all the objectionable features of pollution. They contain heavy lime residues, hair which plugs up sewers, sulfides which have a high immediate oxygen demand, chromium or arsenic which interfere with biological decomposition, and dissolved organic matter which has a long-term oxygen demand. Treatment is usually confined to screening and settling. Mixture of beam house and tan wastes in chrome tannery results in precipitation of chromium hydroxide, with a large excess of calcium carbonate. The actual chromium content of the dried sludge is, however, only 5 to 6 per cent, hardly enough to attempt recovery. The sludge dries well on sand beds. Biological treatment is difficult because of the bactericidal nature of the settled wastes. Chemical treatment by addition of 20 to 30 grains per gallon of alum or sulfuric acid will increase the B.O.D. reduction only to 50 or 60 per cent, as compared with 30 to 40 per cent by plain settling, consequently the cost of chemicals has not



Tannery Waste Plant at Wilcox, Penna.

A Link-Belt rapid mix and flocculating unit, followed by settling units equipped with Straightline Sludge Collectors.

be evaporated to only 25 per cent solids, and the remaining water must be evaporated in rotary steam dryers, which are expensive to operate. This change in operating technique enabled the Hiram Walker Company to evaporate all of its wastes profitably. Another method of accomplishing the same result by means of vacuum filters has been described by Bassett. (*Chem. and Met.*, December, 1938.) The waste is preheated to 35° C. to coagulate the solids prior to filtration. It is claimed that coagulation and filtration removes 18 of the 22 lbs. of solids per bushel of grain ground. The filtrate is clear and can be evaporated to 60 per cent solids. This work was done for the American Distilling Company.

Anaerobic fermentation of distillery or yeast wastes followed by aerobic filtration has been used by Jensen in Denmark, and studied by Buswell and LeBosquet in the U. S. The relative advantages and disadvantages of aerobic vs. anaerobic treatment were discussed by Dr. Buswell at the Boston symposium of A.C.S. (see *Jour. Ind. and Eng. Chemistry*, November, 1939).

An anaerobic digestion plant is being installed for treatment of the wastes of the Standard Brands yeast plant at Pekin, Ill. This development has been supervised by Mr. Fales of the firm of Metcalf and Eddy.

After maintaining for many years that their wastes could not be treated economically, the Commercial Solvents Corporation of Peoria are now evaporating and recovering solids which are valuable for stock feed as a source of vitamin G (riboflavin). For some years a small proportion of these wastes was treated in the digestion tanks of the Peoria Sanitary District sewage treatment works.

It would seem as if it is no longer necessary for the distillery, yeast or fermentation industries to discharge their intensely putrefactive wastes without treatment, and if recovery or treatment plants are not now in operation, plans should be made to alleviate the pollution from such wastes in the near future.

Food Products

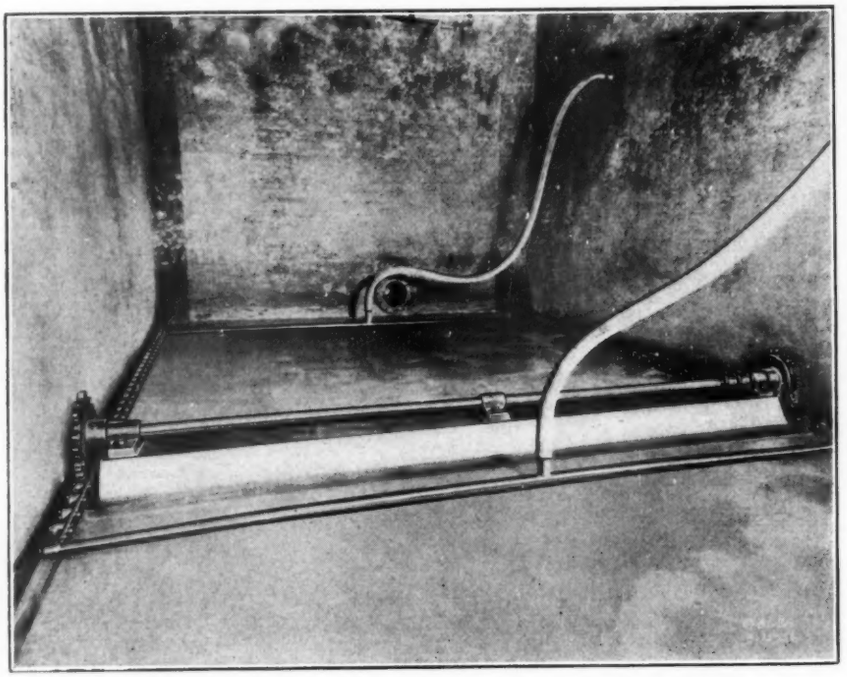
Canning wastes are a very large problem in waste disposal because of their wide distribution, seasonal production and concentrated character. Most of the work on treatment of such waste has been under the direction of Mr. L. F. Warrick of Wisconsin, who has recently submitted a report to the National Canners Association. Former reports of the Wisconsin State Board of Health have also described treatment plants for wastes from beet, corn, tomato and carrot canning. Chemical precipitation on the fill-and-draw basis, followed in some cases by biological filtration, is the prevailing method of treating such wastes.

Tomato canning wastes are a tremendous problem during the brief season of eight to eight weeks. One large plant in Chicago handles up to 3,600,000 lb. per 24 hours and the wastes have a population equivalent up to 200,000 at the height of the season. The wastes are screened but as almost no further improvement can be obtained by sedimentation, and chemical or biological treatment is very expensive, in view of the short canning period, treatment of screened tomato wastes at the sewage treatment works is best from all angles, if the treatment plant can handle the load. For smaller plants, in rural regions, lagoons, or chemical treatment giving about 50 per cent reduction of B.O.D., have been used. Biological filters are practically useless, because of the short period of operation.

Milk Wastes

Milk products wastes have undergone an enormous amount of study and almost all types of treatment have been used for milk and dairy wastes. Activated sludge is used successfully at Somerset, Pa., the Guggenheim process is in use at one or two places, sand filters are widely used in Iowa, trickling filter are used with media such as corn cobs, tin cans or terra cotta tile, and one of the most recent processes, developed by Dr. S. H. Jenkins in England, is that of alternating the direction of flow to two filters in series. He found that the primary filter tends to become clogged after a few weeks use, and at such time the order of waste application is reversed, and the secondary filter becomes the primary unit. After a time the clogged filter becomes cleared, and thereafter the filters are reversed as often as necessary to avoid subsequent clogging. One remarkable part of Dr. Jenkins' work is that he recommends a long period of preliminary settling, and is not concerned by the mounting acidity of the liquors, whereas American investigators have recommended filtration of the wastes as promptly as possible, with little or no preliminary sedimentation in which acid production may take place.

Dr. Jenkins' scheme was considered to have merit for treatment of sewage, and large scale tests are being made of the alternate filter scheme at Birmingham, England. When the writer visited Birmingham in August, 1938, he was shown four percolating filters by Mr. Whitehead, which were to be used to study this procedure. The filters were each 115 ft. in diameter and 6½ ft. deep. The work has been under the direction of the Department of Scientific and Industrial Research, headed by Dr. H. T. Calvert and Dr. A. Parker. A progress report on the results



Paper Mill Waste Recovery Unit at Combined Locks, Wisc.

This plant has paid handsomely in clay filler and paper stock recovered, through continuous removal by Chain-Belt's all-bronze reciprocating type "Tow-Bro." Collector Mechanism. The effluent is returned to the mill for money saving re-use, instead of waste to the stream.

been considered justifiable. Ferric salts have been used on the stronger wastes from a tannery in Michigan, as reported by Eldridge, with operation on the fill-and-draw basis.

Considerable progress might be made in the tannery waste problem if the processes in the tannery could be modified to use chemicals which have a lower oxygen demand. For example, in some tanneries di-methylamine is being used as a depilatory in place of sodium sulfide, resulting in considerable reduction of the immediate oxygen demand of the wastes.

Oil Wastes

The American Petroleum Institute has been studying the problem of oil wastes for many years and has issued manuals of recommended types of treatment. At the Boston symposium, Mr. J. Bennett Hill of the Sun Oil Company described a separator 108 ft. long, 40 ft. wide and 10 ft. deep, designed for an average flow of 7 m.g.d. The oily influent passes through a bed of crushed rock or other packing which causes some coalescence of the oil films. The floated oil is skimmed in two stages. If an emulsion resists such coalescence, alum is used. Under good conditions of operation the oil content of the effluent can be reduced to 10-15 p.p.m.

[The largest and most successful treatment plant serving the oil industry is located in Southern California. This plant and its performance is to be the subject of an article to appear in an early issue of this magazine.—Ed.]

Oil-field brines have created many problems in the mid-western and western states. The chloride content varies from 30,000 to 120,000 p.p.m. Attempts are made to get rid of such brines by solar evaporation, seepage, pumpage to streams during flood flow, return to sub-soil by drilled wells, and (rarely) artificial evaporation, but all methods are largely ineffective.

Coke and Phenol Wastes

Ammonia-still wastes from by-products coke plants can be treated for removal of phenol by benzol extraction, steam separation (Koppers), tricresyl phosphate extraction, or biological oxidation. The wastes from four by-products coke plants in Chicago have a population equivalent of 111,000 based on B.O.D. They are discharged to the sewers and treated at the Calumet and Southwest Treatment Works of the District. This is the most efficient process available, because it reduces the B.O.D. and phenol 90 per cent whereas extraction accounts for only around 60 per cent reduction of B.O.D. even though 90 per cent of the phenol may be extracted. However, discharge into sewers transfers the cost of disposal from the coke plant to the sewage works.

The Dow Chemical Company has a large trickling filter plant for biological destruction of the phenol present in wastes from their synthetic phenol plant. These filters, as well as other waste problems of the Dow Company, were discussed by I. F. Harlow at the Boston meeting of the ACS and published in the November, 1939, issue of *Industrial & Eng. Chemistry.*

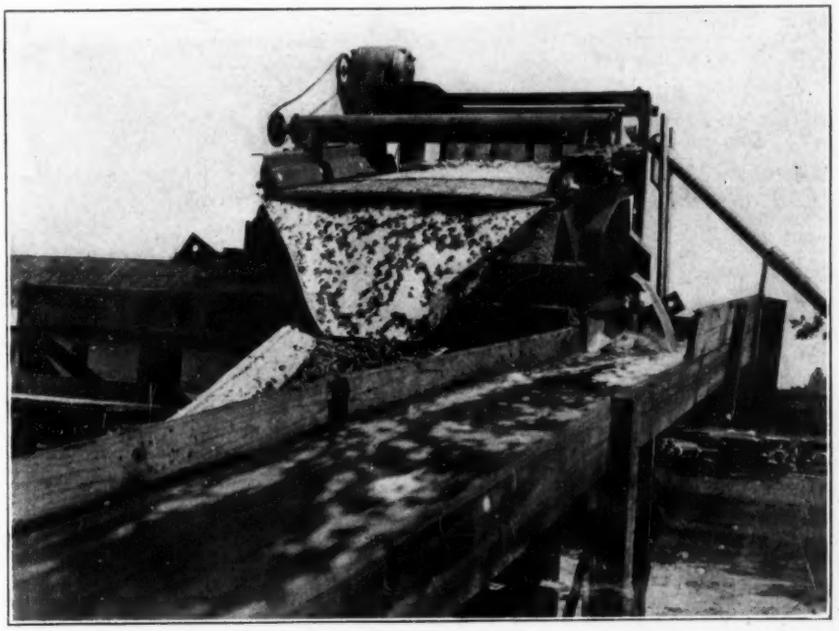
A very complete report of 150 pages on the properties of gas-works effluents and their disposal was published in 1939 by Dr. Arthur Key for the English Institution of Gas Engineers. The discharge to sewers seems to be a particularly favorable method of disposal, from the standpoint of the gas industry, but possibly not so favorable from the standpoint of sewer authorities, unless there is some participation in costs of treatment facilities and the ratio of waste to sewage is satisfactory.

In Germany the recovery of phenol from coke-plant wastes has increased to a total of 5,670 metric tons (6,237 U. S.) in 1938. This is still only about 20 per cent of the phenol produced in all German coke plants.

Miscellaneous Chemicals

Wastes from a large concentration of chemical plants along the Raritan River have engaged the attention of the New Jersey State Board of Health for some time. The flow of wastes totals 38 m.g.d., and the population equivalent is 439,000. Mr. Leroy Forman reported at the January, 1940, meeting of the New York Sewage Works Association that 19 industries have treatment plants in operation, 11 have plants under construction, and 6 are studying methods of alleviation. This is a very remarkable record. [It is predicted that the end of 1940 will see essentially a complete program of industrial waste treatment in addition to sewage treatment provided in the Rahway Valley.—Ed.]

The rapid progress of the synthetic chemical industry in all countries is creating new problems in waste disposal. In Germany some of these wastes were studied in 1939 by Dr. Husmann, of the Emscher District. The wastes included those from (1) the I.G. synthetic benzine process, in which coal is finely ground in oil and hydrogenated at 300 atmospheres pressure and 450° C.; (2) the Fischer-Tropsch benzine process, in which water gas ($CO+H_2$) is synthesized to benzine at 200° C. in presence of a catalyst; and (3) the synthetic production of fatty acids and soap from by-product paraffins of the Fischer-Tropsch process. The wastes from the first process are fairly weak, neutral, and easy to treat, those from the second are also weak and nearly neutral, while those from the third process contain from 5,000 to 10,000



Cannery Waste Screening Unit—Vincetown, N. J.

Handling tomato canning wastes, this Link-Belt Vibrating Screen (20 x 30 mesh stainless steel cloth) is handling 300 gpm. and removing one barrel of solids every 25 minutes.

p.p.m. fatty acids and promise to be very difficult to treat.

Wastes from the manufacture of artificial rubber (Buna) and from the manufacture of sugar from wood also require consideration, but present no particular difficulties, according to Dr. Husmann.

Iron and Steel Wastes

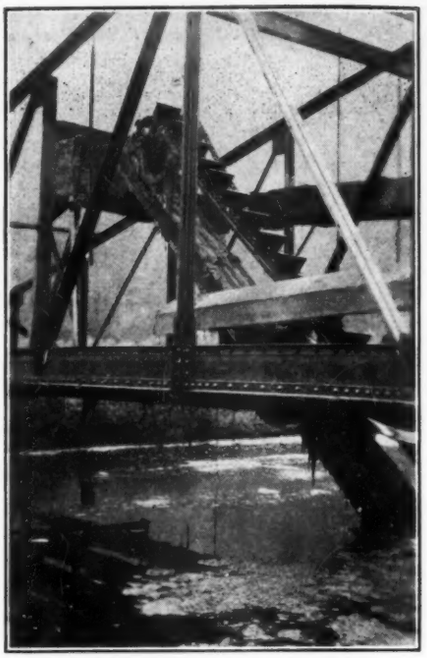
Pickling liquors constitute probably the most widely distributed wastes in this country, and many problems are created wherever they are discharged. In streams they may acidify the water, and will use up oxygen, precipitate iron oxide, and color the water red, if aerobic, or black if anaerobic. In sewage treatment works such wastes interfere with operation in various ways. In the Calumet Treatment Works of the District, pickling wastes clogged the filtros plates by deposition of iron and increased the air pressure until aeration tanks frequently had to be shut down to clean the plates with acid. The average iron content was 18 p.p.m. and many "shots" brought in several hundred p.p.m. for short periods. By diverting the wastes to the Calumet River and reducing the average Fe content to 4 p.p.m. much of the difficulty was eliminated, and no comparable harm was done to the river, but the problem is not solved by such a procedure.

[Difficulty at the Cleveland Southerly Treatment Plant of a like-nature caused serious clogging of diffuser tubes of the Swing Type Diffusers. It is reported that a light application of grease rubbed into the surfaces of the tubes corrected the difficulty.—Ed.]

The cost of neutralizing and precipitating pickle liquors with lime is very considerable, and because of the lack of any other method considered satisfactory by the steel industry, the American Iron and Steel Institute for the past two years has conducted an extensive investigation of the disposal of pickling wastes at Mellon Institute under the direction of Dr. Willard W. Hodge, Chemical Engineer. Dr. Hodge gave a most complete report of the status of his investigations at the Boston meeting of A.C.S. His estimate of the discharge of ferrous sulfate (copperas) in pickling liquors was 686,000 tons per year, and only 44,000 tons was recovered and used, or one-sixteenth of the total. Very many processes of recovery are now under investigation, which are described in Dr. Hodge's report, to which the reader is referred. Some over-publicized processes, such as the "Ferron" process, do not seem likely to be the solution of the problem. Recovery of copperas by evaporation is being studied in many new processes. It seems anomalous that the fixed price of $14 per ton is maintained for copperas, when there is such a large surplus of available pickle liquor, and also a possibility of considerably increased use in sewage treatment as such or as chlorinated-copperas, if the cost could be lowered.

Rates of Charge for Waste Treatment

In the U. S., charges by the sewer authority for treatment of industrial wastes have either been overlooked, or settled by agreement, or based on volume, with possibly some consideration of the strength as shown by B.O.D. or suspended solids. It is recognized that these bases are quite favorable to the industries, but because of the economic necessity for industries and the advantages of large industrial payrolls, industrial wastes have sometimes been considered either unavoidable or justified burdens at the sewage treatment works. However, other important industries which do not burden sewage treatment plants also bring prosperity and payrolls. Therefore, it seems logical to evaluate the cost of treating wastes from wet industries, and to make a charge based on flow and constituents of the wastes which are responsible for costs of disposal at the sewage treatment works.



Sludge Elevator for Lagoons
Has given a good account of itself at a Noxen, Pa. tannery.

In England the new Drainage of Trade Premises Act has been engaging the attention of sewerage authorities for the past year, and one of the most interesting cases of its intended application is at Manchester. Mr. Wm. Porthouse, Secretary of the Manchester Corporation Rivers Department, has discussed this problem at length in the Annual Report ending March 31, 1939, purchasable from P. S. King and Son, Ltd., Orchard House, Great Smith St., Westminster, London, S.W. 1, for 2S 6d (about 50c at present exchange) plus postage. The report was abstracted by Mr. Langdon Pearse in *Sewage Works Journal* for January, 1940. The methods proposed for assessing charges for handling wastes are of particular interest.

For many years the Ruhrverband in Germany has had a varying scale for treatment of industrial wastes, based originally on the strength and character of wastes, and modified from year to year in accordance with production or number of employees. Wastes are divided into some seven classes. The surcharges, in marks per employee, increase as follows for the more concentrated wastes: brewery, 4 M.; dairy, 10 M.; tannery, 16 M.; and yeast, 35 M.

In the U. S. a number of agreements between sewage treatment authorities and industries specify that the industry must deliver wastes containing less than a certain content of suspended solids and B.O.D. It is obvious that this a rather fallacious standard, if the volume is not also stated, as the industry could deliver a waste of the specified strength merely by dilution. The proper standard should include volume, pounds of settleable solids, and pounds of B.O.D.

Books on Industrial Wastes

Two noteworthy books appeared in 1939 dealing with industrial wastes but unfortunately neither is American

and both are very expensive. The Report on Sewage and Industrial Wastes to the Government of South Australia at Adelaide, by Mr. H. J. N. Hodgson contains an excellent resume of the status of industrial waste disposal in the U. S. and England, but as this was a private report, only a few extra copies are available at £ 5 per copy. The other book, "Technologie des Wassers" by Dr. F. Sierp of the Ruhrverband, contains 719 pages, 200 of which are devoted to industrial wastes and their disposal. It is certainly the best book now available on this subject, but unfortunately is available only in German and costs the outrageous sum of $45, even if one could get it.

Primary Filters of Armour & Co. Plant at Fargo, N. D.

These units operate as roughing filters, become clogged in time, and are cleared by back-washing at required intervals. This picture was taken during a back-wash.

There are no American books on industrial wastes but a series of reports is being prepared by the U. S. Public Health Service at Cincinnati, which will be equivalent to a fairly comprehensive book on this subject. Preliminary reports have been issued on wastes from the oil industry, milk industry, corn canneries, tomato products, paper, tanneries, packinghouses, and probably others.

Economics of Disposal

Although the field of industrial waste disposal is still largely undeveloped, there are a number of outstanding examples in this country where recovery of former waste products has been a benefit to the company concerned. Recovery of stock food in the corn products and fermentation industries has been profitable and other examples were cited at the Boston symposium of materials formerly considered by-products which now are staple items of manufacture. Such recoveries are always the first objective in a program of waste alleviation, the second objective is recovery or elimination inside the factory, even at some expense, and finally the residual wastes may require treatment outside the factory, either as is or mixed with sewage. Sometimes glowing prospects are held out for profitable recoveries of waste materials, but industry usually has no illusions about values in wastes. When a program of waste disposal is initiated, it might as well be realized that it will cost something before it is finished. This fact was well expressed in the paper presented at the Boston symposium by Mr. Anthony Anable of the Dorr Company. Mr. Anable said:

"Although it is true that many companies, after thoroughly studying their waste problems, are able to increase their over-all recovery by plugging leaks or minor changes in their processes, and although others may produce salable by-products from their wastes, it is perhaps wiser to consider waste treatment as man's duty to society and the cost as an overhead on the manufacturing operation. This situation may change with the years, but such an attitude will prevent many disappointments."

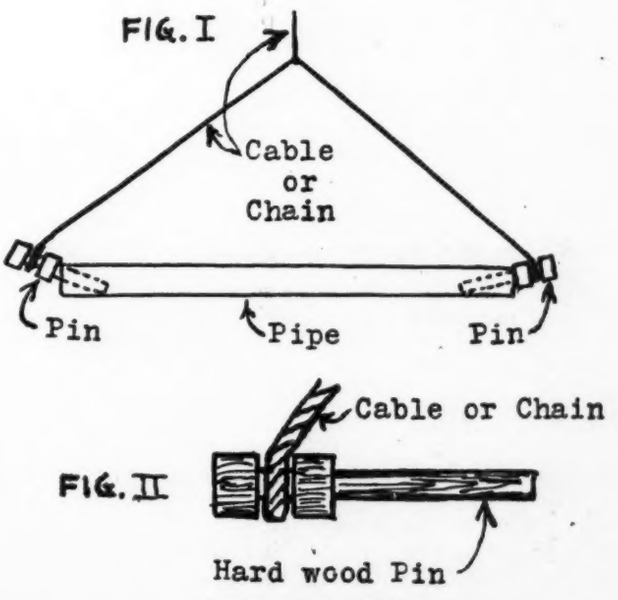
KINK FOR PROTECTING PIPE THREADS

By W. F. SCHAPHORST, M.E.
Newark, N. J.

When handling heavy threaded pipe or other water supply equipment, mechanically, a common method is to use steel hooks on the ends of the cable, chain, or rope. These hooks are hooked into the ends of the pipe, or into any convenient opening, often resulting in battered threads. If the pipe is provided with nipples the internal threads of the nipples are almost certain to be battered to some extent, and even where the threads are external they are frequently damaged.

The accompanying sketch shows how to avoid this battering. Two hard wood pins, turned as indicated (detail sketch) will prevent metal from coming in contact with the threads. Simply insert the ends of the pins into the pipe as shown and let the hoist do the rest. This method is just as quick as with metal hooks, and is certainly far preferable.

Of course this "pin method" is not applicable to all equipment, but it is hoped that this kink will prove helpful in suggesting solutions for any handling problem involving thread protection.



Sketches of the Device

WATER WORKS & SEWERAGE, March, 1940

"PACKAGE DELIVERY" WASTE TREATMENT PLANTS

In Which All-Steel Construction Makes for Economy and Erection Simplicity

By E. B. MALLORY

Director of Research
Lancaster Iron Works, Inc.
HACKENSACK, N. J.

THE idea of a factory-fabricated sewage treatment plant to accommodate small load requirements, has long intrigued the imagination of sanitary engineers, and the alluring possibilities of such ready to assemble units have been frequently discussed at engineering meetings.

During the year 1939 this idea materialized in a line of "Package Delivery" waste treatment plant units, manufactured by Lancaster Iron Works, Inc., Lancaster, Pennsylvania. The various units regularly supplied include: Primary Treatment Units (Imhoff or plain sedimentation tanks), Secondary Treatment Units (oxidized sludge aerator-clarifier tanks), Third-Stage Treatment Units (chemical coagulation and chlorine sterilization tanks), and Separate Sludge Digestion Tanks.

State highway trucking regulations limit the maximum diameter of these tanks for transport by trucks to eight feet, and practical considerations limit their height to a maximum of approximately twenty-five feet. Within these mechanical limitations, loads up to 150 or 200 pounds of 5-day B.O.D. per day may be given complete treatment in units of permissive dimensions.

All-Steel Construction

The "Package Delivery" plant is made possible by the employment of steel plate tank construction, permitting complete assembly of the tank at the factory, at costs substantially lower than concrete construction for plants of like size, and providing greater durability. The various pumps, compressors and other associated parts and equipment, are housed within the tank shell. If desirable such equipment may be assembled in place in the units before shipment from the factory. This feature eliminates expensive excavations and a separate building to house the equipment. Field erection is greatly simplified as it only involves placing the tanks on suitable foundations or footings, and connecting the waste, effluent and sludge lines, and the electrical service.

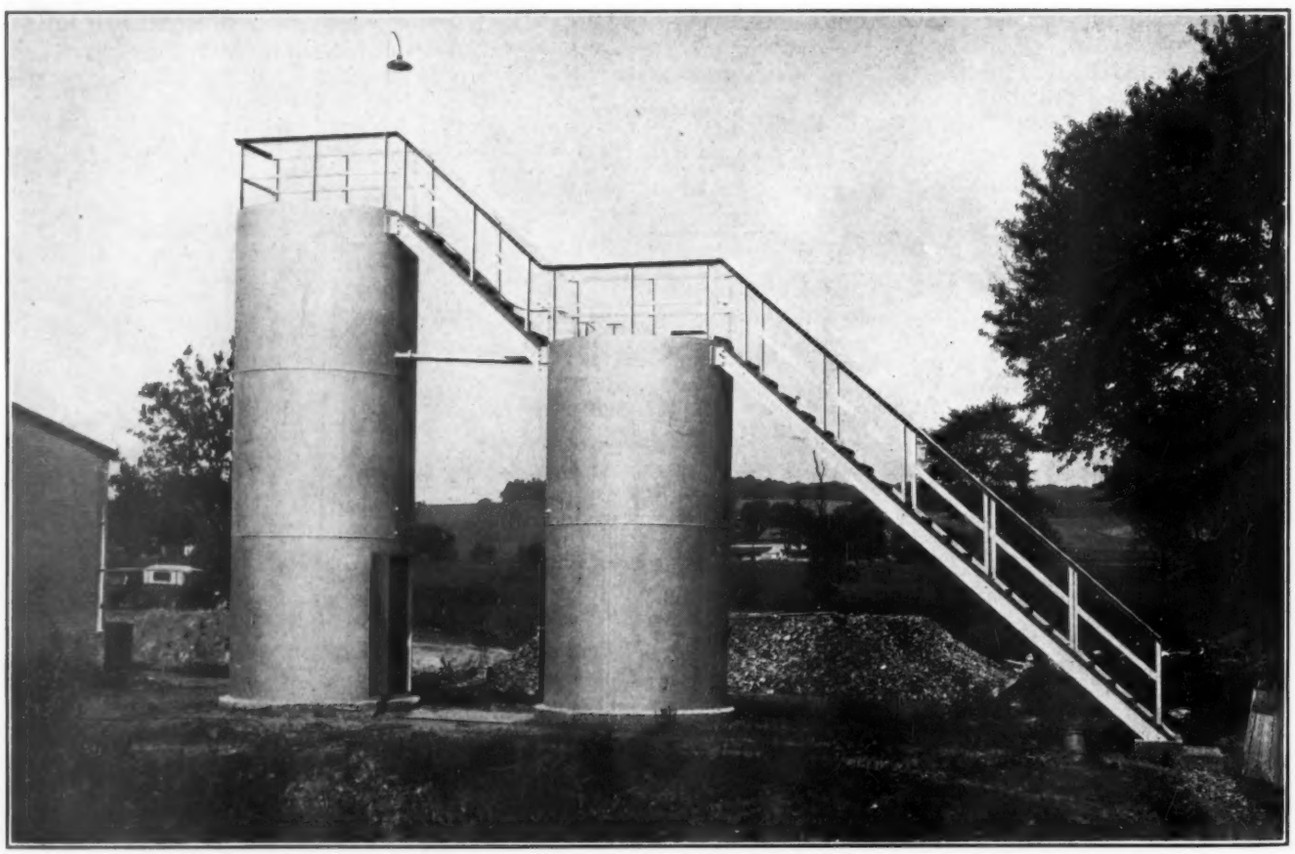
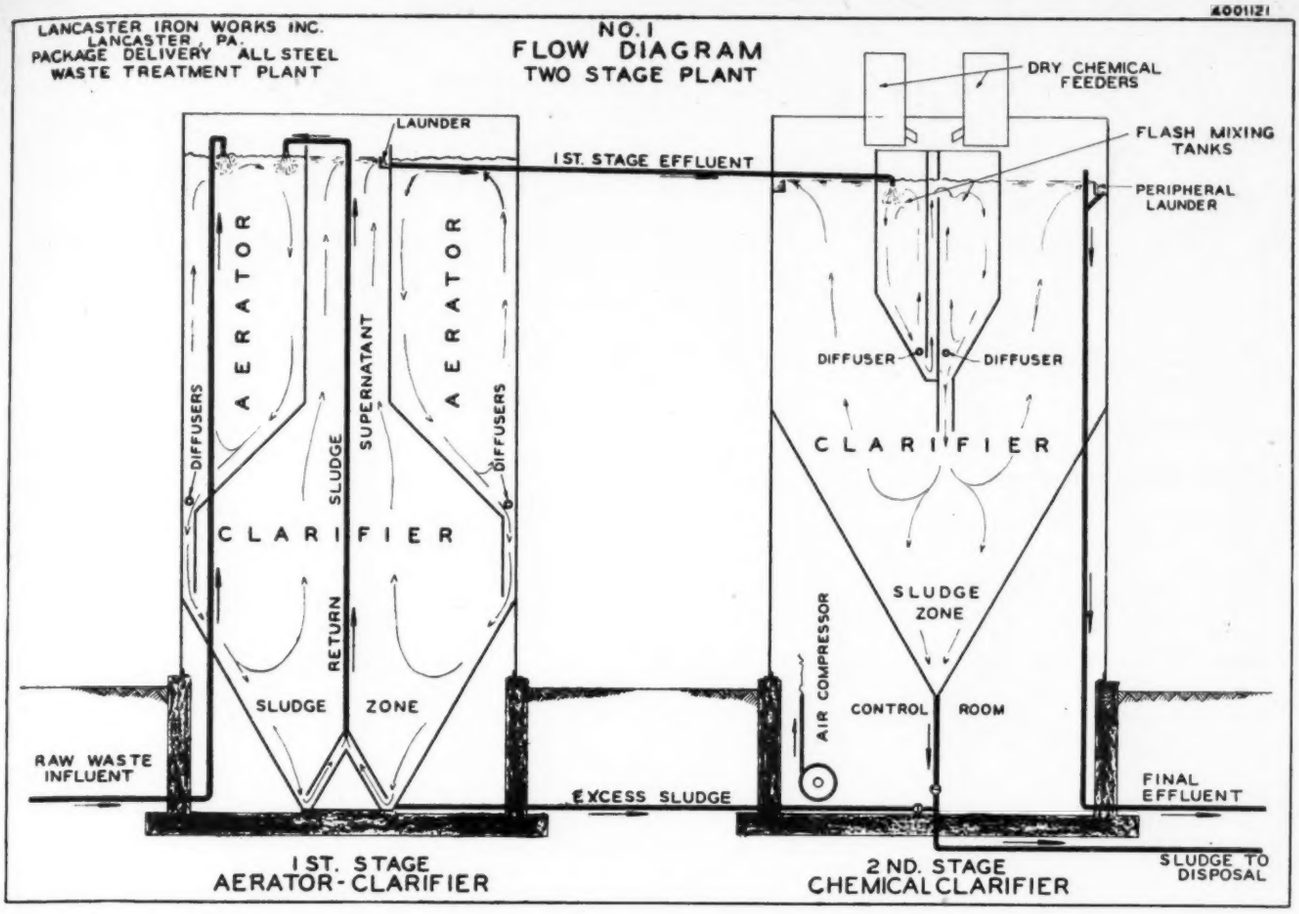
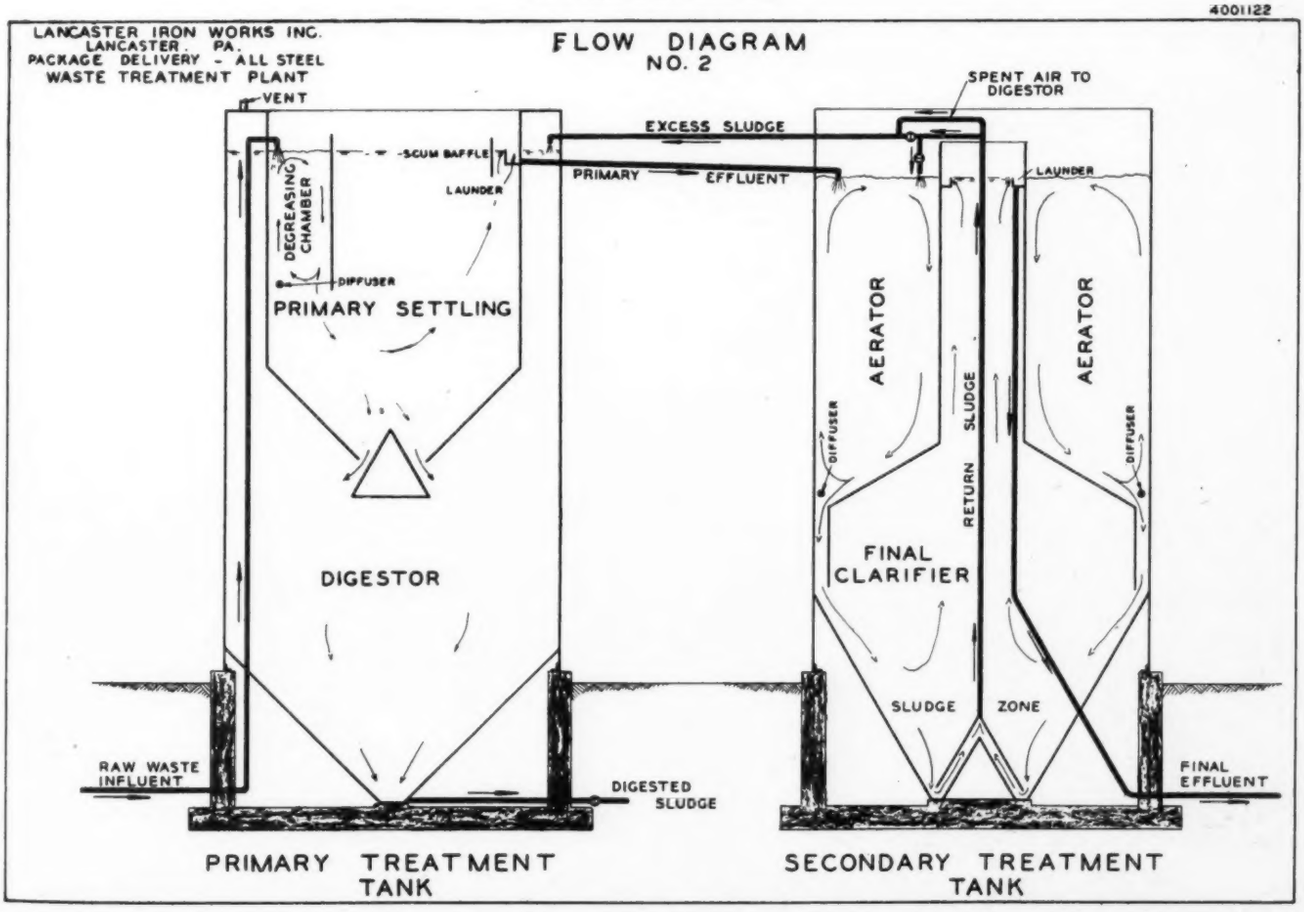


Plate 1—Complete Two-Stage "Package Delivery" Waste Treatment Plant Serving Milk Products Plant.
(The Abandoned Trickling Filter Appears in Background.)



Flow Diagram 1—Picturing the Course of Liquid and Sludges Through a Two-Stage Plant Treating Wastes That Require No Preliminary Settling.



Flow Diagram 2—Picturing the Course of Treatment Through a Two-Stage Plant Providing Primary Settling Followed by the Bio-Flocculation and Oxidation.

Steel plate construction has been employed in sewage practice for a number of years, exhibiting durability, and freedom from spalling, cracking and repair. Many tanks supplied by this manufacturer have been in constant service for over thirty years.

A Two-Stage Plant

The two-stage treatment plant illustrated in Plate 1 is believed to be the first factory-fabricated "Package Delivery" complete treatment plant installed in this country or abroad. It was designed to treat the difficult wastes arising in a milk products plant, constituting a normal loading of twenty-five pounds of 5-day B.O.D. per day.

The taller first-stage tank, twenty-two feet high, incorporates within the tank facilities for the complete Oxidized Sludge Process, including a manually cleaned fine screen, a combination aerator-clarifier, an air compressor, and an excess sludge pump. The latter unit was necessitated by the location of sludge disposal facilities on a hill approximately forty feet above the treatment plant, but normally the excess sludge is bled off to digestion tanks by gravity.

The shorter second-stage tank, sixteen feet high, is a self-contained coagulation, neutralization and sedimentation tank, in which any thinly dispersed colloidal or flocculent suspended matter remaining in the first-stage effluent is coagulated and neutralized, the resultant precipitated sludge being withdrawn and combined with the first-stage sludge for disposal.

The effluent delivered is uniformly sparkling clear, having a minimum dissolved oxygen content of 80% saturation during the hottest weather. Where receiving water requirements are particularly severe, calcium hypochlorite is substituted for a portion of the hydrated lime applied in this tank, providing substantially complete effluent sterilization and other stream benefits resulting from chlorination.

Flow diagram No. 1 illustrates the course of the liquid wastes and sludges through this two-stage milk waste treatment plant. The treatment of milk wastes represents a troublesome problem when available space is limited and in locations where required receiving water conditions dictate the need for substantially complete treatment. However, the two-stage "Package Delivery" unit has provided a simple, reliable and inexpensive means of effectively treating these difficult wastes.

Operating Results

Schedule A includes typical quantitative data derived from tests by State Health authorities, indicating the losses to be expected in dairy plants, the characteristics of the load to be treated and the high degree of treatment provided by the two-stage oxidation-sedimentation process, under periodic overloads.

All of the power requirements, including compressed air for aeration, return sludge supply, chemical mixing, and supernatant liquor aeration, represent a load of approximately 2 h.p. Other than the normal maintenance of a motor and compressor, and the occasional painting of the exterior of the tanks, at four or five year intervals, maintenance is reduced substantially to zero, as there are no moving parts involved. At normal full load, approximately twenty-five pounds of sulphate of alumina and five pounds of hydrated lime are required per day.

Flow diagram No. 2 illustrates the path of the wastes and sludge through a two-stage treatment and self-contained digestion plant adapted to treat domestic sewages and comparable industrial wastes. In this type of plant, the first-stage tank is of the Imhoff type, providing primary sedimentation and digestion. A complete Oxidized Sludge Process secondary treatment is provided in the second-stage tank.

RESEARCH LABORATORIES
LANCASTER IRON WORKS, INC.
HACKENSACK, N. J.

SUMMARY
PERFORMANCE DATA
"LANCASTER" WASTE TREATMENT PLANT
AT
HIGHLAND DAIRY PRODUCTS COMPANY
DOE RUN, PENNSYLVANIA

DATE OF TEST	WASTE FLOW GPD	VOL. SUSP. SOL. LBS.	FIXED SUSP. SOL. LBS.	TOTAL SUSP. SOL. LBS.	VOL. DISS. SOL. LBS.	FIXED DISS. SOL. LBS.	TOTAL DISS. SOL. LBS.	TOTAL VOL. SOL. LBS.	TOTAL FIXED SOL. LBS.	TOTAL SOL. LBS.	5-DAY B.O.D. LBS.	MILK RECEIPTS LBS.	MILK SOLIDS LBS.	PERCENT LOSS TO WASTE	GALS. WASTE PER GALS. MILK RECEIPTS
SPRINKLING FILTER PLANT (ABANDONED)															
SEPT. 15-38															
RAW WASTE	22,000	136.0	5.5	141.5	390.0	278.0	668.0	527.0	281.0	808.0	244.0	17,200	2,150	37.6	11.0
EFFLUENT		84.7	8.8	93.5	215.0	140.0	365.0	300.0	148.0	448.0	210.0				
% REDUCTION		37.8	+60.0	34.0	45.0	49.7	46.8	43.0	47.3	44.5	14.0				
LANCASTER "PACKAGE DELIVERY" TREATMENT PLANT															
MAY 18-39															
RAW WASTE	3,800	24.5	0.6	25.1	31.9	10.9	42.8	56.4	11.4	67.8	49.2	17,050	2,140	3.17	1.92
EFFLUENT		1.9	0.8	2.7	6.1	21.1	27.2	8.0	21.8	29.8	1.1				
% REDUCTION		92.3	+30.0	89.5	80.9	194.0	36.5	86.0	191.0	56.0	98.0				
MAY 24-39															
RAW WASTE	5,940	25.8	2.0	27.8	32.7	17.8	50.5	58.5	19.7	78.2	56.0	16,200	2,030	3.85	3.15
EFFLUENT		.815	.11	.725	2.9	22.1	25.0	3.5	22.7	26.2	3.1				
% REDUCTION		97.5	94.5	97.5	91.2	+24.0	50.5	94.0	+15.0	66.5	94.5				
JULY-18-39 L.I.W.															
RAW WASTE	8,370	47.7	9.5	57.2	89.4	27.3	116.7	137.0	37.0	174.0	153.6	14,650	1,825	9.5	4.9
EFFLUENT		1.4	2.1	3.5	15.4	45.5	60.9	16.8	47.5	64.3	1.8				
% REDUCTION		97.0	78.0	94.0	83.0	+17.0	48.0	88.0	+28.0	63.0	99.2				

DATA ON SEPT. 15-38 RELATES TO PERFORMANCE OF SPRINKLING FILTER 28' SQUARE - 4,700 FILTER FEET.

SCHEDULE A

Schedule A—Revealing Typical Plant Loadings and Performance Data of a Milk Waste Treatment Plant.

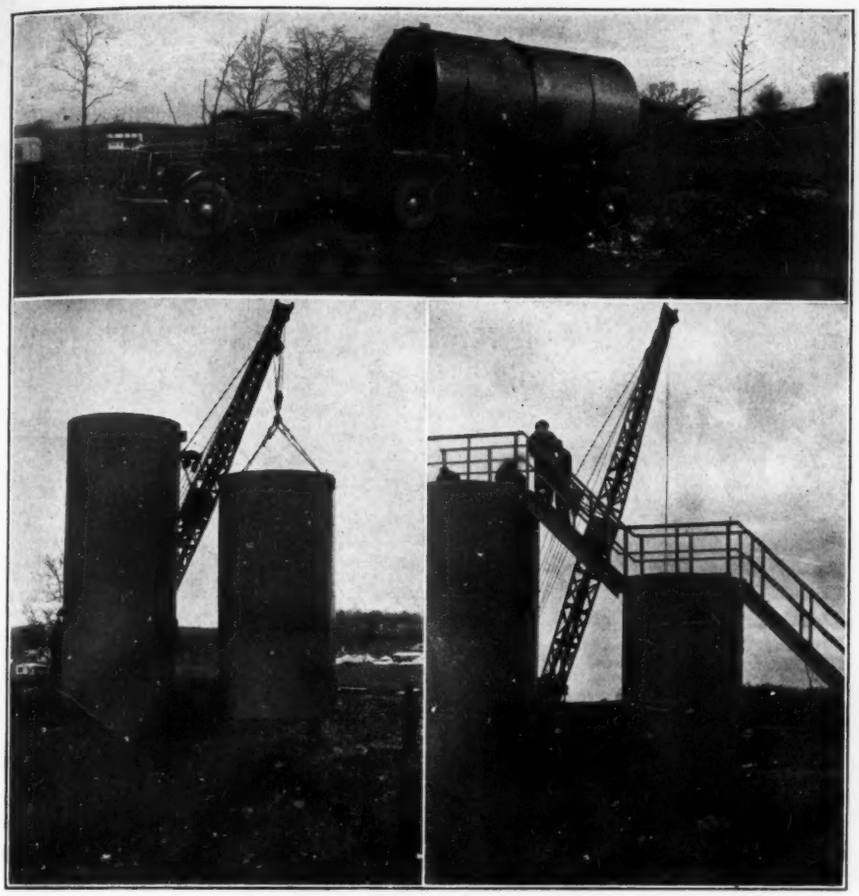


Plate 2—Illustrating the Simplicity and Rapidity of Erection of a "Package Delivery" Plant.

(8:00 A. M.—Tanks arrive at plant site; 10:00 A. M.—the second tank is being set on its foundation; 2:00 P. M., the same day, tank and walkway erection completed.)

Odor and Hazard Prevention

A unique departure from conventional practice is incorporated in plants of this type to insure freedom from explosion hazards or odors due to the gases developed in the digestion tank. The annular compartment of the digestion tank is sealed and provided with an appropriate vent. Spent air from the main return sludge air lift in the second-stage tank is delivered through a pipe to the first-stage tank and discharged into the annular gas space above the scum layer in the digestion compartment. This purging air serves to force out, and dilute in the ratio of about 400 to 1, the gases developed by digestion. The continuous rapid removal of this gas and the high degree of dilution, precludes any possibility of explosion and effectively eliminates objectionable odors.

Aeration Economy by Unique Scheme

The arrangement of the aerator and clarifier compartments in the Oxidized Sludge Process tank unit is a new and unique development. The vortex ring aerator (see Flow Diagrams) eliminates the losses inherent in spiral flow aerators, permitting greatly increased loadings per unit of volume. In comparison with typical municipal plant spiral flow aerators, in which a ratio varying from 20 to 25 cu. ft. of volumetric holding capacity per pound of 5-day B.O.D. per day is required, the vortex ring aerator will provide a comparable degree of oxidation at a ratio of 5 or 6 cu. ft. of holding capacity per pound of 5-day B.O.D. per day.

Sludge removal mechanisms and other moving parts are eliminated by reason of the velocity of flow downwardly along the cone surfaces in the clarifier compartment, resulting in an extremely simple and durable construction, requiring no maintenance.

Air is applied to the vortex ring aerator through a circular, sectional ring pipe, provided with an appropriate number of equally spaced, self-cleaning jet diffusers, positioned adjacent the outer wall of the aerator, and immediately above the annular slot through which the mixed liquor discharges, counter flow, into the clarifier compartment.

Erection Simplicity

Field erection is simple, cheap and rapidly accomplished. Plate 2 illustrates, in sequence, one of the tanks of the complete plant on the delivery truck at the plant site at 8:00 A.M., progress of erection at 10:00 A.M., and later the completely erected tanks and walkways at 2:00 P.M. of the same day. All internal piping, ducts and other connections to external piping, or wiring, are installed in the factory and only require connection to the underground pipe lines and conduits, to complete the erection.

The various units are correlated in design, and when installed complete and put into operation by the manufacturer, a suspended solids and B.O.D. removal efficiency of 95%, as minimum performance, is guaranteed by the manufacturer. In circumstances requiring higher degrees of purification, designs are accommodated to such requirements and higher pre-determined degrees of efficiency are similarly guaranteed. The normal full load capacity of treatment plants of this type may be accurately determined and incorporated in installation contracts as the basis of definite guarantees.

Overload Capacities

A feature of particular interest is the remarkable overload capacity inherent in these small plants. The treatment plant illustrated in Plate 1 was designed for a normal full load of twenty-five pounds of 5-day B.O.D. per day. In Schedule A, however, it will be observed that even under periodic overloads of 100% to 500%, the B.O.D. removal efficiency varied from 94% to 99%.

Unprincipled or careless owners or operators cannot, by neglect or intent, readily defeat the purpose of these plants, which provide an additional assurance to the stream authorities that the receiving waters will be uniformly protected under conditions of accidental overload or temporary neglect in operating attention.

The operation of these plants is substantially automatic, the labor factor being reduced to a requirement of about one hour per day, during which the operator may perform all the necessary duties, including withdrawal of excess sludge from both tanks, cleaning screen basket, inspecting or oiling the motor and compressor, and replenishing chemicals in the feeder hoppers. Routine control tests are extremely simple, such

being limited to a centrifuge test of mixed liquor once daily.

The Lancaster Research Laboratories, in Hackensack, N. J. (a Division of Lancaster Iron Works, Inc.), maintains a complete sewage testing laboratory and a competent staff of technicians to make complete surveys of industrial waste problems on which design and construction details of these plants are predicated. Such facilities are available to consulting engineers, municipal engineers, or others requiring accurate data of this kind or other assistance in waste treatment problems.

The factory-fabricated, "Package Delivery" treatment plant has a distinctive appeal to consulting engineers who find that small projects are usually unprofitable. The elimination of expensive excavations, separate control buildings and much of the unprofitable detail work required of the consulting engineer, in office and field, results in substantially lower costs of a complete installation.

MICHIGAN UPPER PENINSULAR WATER OPERATORS' CONFERENCE HOLDS FIRST MEETING

Some of Those Attending the Organization Meeting

(1) Geo. J. Wealton, Chief Engr., Marquette State Prison, and H. R. Thompson, City Engr., Newberry; (2) Geo. Walner, City Eng., Iron Mountain, "Ray" Faust and O. E. McGuire, State Dep't. of Health Engineers (Mr. Faust being Sec'y. of the Michigan Water Operators' Conference), Anton Kovochich, Chemist, Iron Mountain; (3) "The Colonel"—E. D. Rich, Veteran Chief Engineer of the State Dep't. of Health—on hand to see the Conference off to a good start; (4) H. A. Cordt, Rensselaer Valve Co., E. M. McHugh, Sup't. Ironwood (travelled greatest distance to meeting—also his first), Jo Rizzie, Sup't. Ramsay; (5) "Mike Foley, Hersey Meter's Chicago representative and Geo. Nelson, Everson Mfg. Co., Chicago—(to Mr. Nelson—appreciation for the accompanying snapshots.

A WATER Operators' Conference has been organized for the benefit of water works men in Michigan's Upper Peninsula—in particular those men who have found it difficult to attend meetings of the long established Michigan Water Operators' Conference which has so effectively served the Lower Peninsular.

The first meeting of the Upper Peninsular Conference was held February 14th and 15th in Escanaba. Amongst the 65 registrants were many who had not before attended a Conference meeting.

A feature of the meeting was the very informal "General Discussions" and "Question and Answer" periods. Another was the visit to the new Water Treatment Plant of the Escanaba Paper Co., which employs Dorr Clarifiers equipped with Magnetite Filters.

The member credited with the greatest distance travelled to the meeting (208 miles) was Ed. M. McHugh, Sup't. at Ironwood, Mich. The member with the longest service period to his credit was W. J. Johnson, Sup't. at Marquette, having been connected with the Water Department for 50 years. Incidentally, it was the first Conference meeting ever attended by either of these two men.

Officers:

The following officers were elected:

Chairman—S. J. Shank, Sup't. Escanaba.

Vice-Chairman—C. V. Howard, Sup't., Kingsford.

Sec'y.-Treas.—R. Abramsen, Chemist, Manistique.

Directors—F. W. Manning Newberry); Dr. Chas. Drury (Marquette); S. J. Williams (Menominee).

Officers

(1) Director F. W. Manning, Sanitarian, (Newberry); (2) Director S. J. Williams, Sup't. (Menominee); (3) Sec'y. and Treas., Richard Abramsen, Chemist (Manistique); (4) Director Dr. Chas. Drury, Health Officer (Marquette); (5) The Chairman, S. J. Shank, Sup't. (Escanaba); (6) Vice-Chmn., Claude Howard, Sup't. (Kingsford).

RECREATIONAL USE OF WATER SUPPLY AREAS

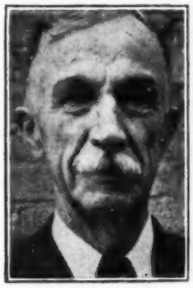
Problem to be Tackled by New Jersey Section in Cooperation With Other Interests

A TRIP to see "Transite" pipe produced and a symposium on the red-hot topic—

"Recreational Use of Water Supply Areas—To What Extext Should It Be Permitted"

proved the perfect combination to draw to the February meeting of the New Jersey Section of A.W.W.A. a record attendance for a Winter Meeting.

The Chairman
Edw. P. Hyland, Sup't., Water Works & Sewerage Moorestown



Voted Fuller Award
A. L. Van Gilder, Engr.-Sup't. Water Department Atlantic City

On February 7th about 100 members and guests gathered at the Johns-Manville pipe plant at Manville, N. J., to spend the forenoon inspecting the plant, watching the production of "Transite" cement-asbestos water and sewer pipes, ask many questions, but take no pictures. Then, by buses to near-by New Brunswick for luncheon and the afternoon technical session, attended by 150 more members and guests, at the Roger Smith Hotel.

Immediately following the luncheon Chairman Hyland introduced Messrs Patterson and Dandrow of J-M who he said were being put on the spot, at their consent, and declared "open season" for 15 minutes of questions concerning "Transite" pipe manufacture, its adaptations and service record. In the ensuing question and answer period the following was developed, there being no sidestepping of any question put.

In comparing cement-linings and "Transite," it was stated that the asbestos-cement pipes contained less free lime; however, the same bleeding to waste would be required for new mains of "Transite," as is true in the case of new cement lined mains. Such bleeding is continued until the free lime has been leached out. Answering the question—"Will "Transite" eventually become porous or soften due to leaching out of soluble salts?"—the answer was, that the water soluble compounds were insufficient for either to happen. In tests made by Wm. R. Copeland, Chief Engineer of the Connecticut Water Pollution Commission, investigating the life expectancy of "Transite" on waters of very low pH value, it had been calculated that at the rate of attack by water of pH 3. a pipe of only ½ inch wall thickness would have a life in excess of 35 years. In connection with acid waters, such as mine drainage, protective penetrating bituminous coatings are employed, a favored coating being Du Pont's W x 41, applied cold by spraygun or brush.

Asked if "Transite" would be recommended for laying through saltmarsh or cinder fill, Mr. Patterson referred to installations at the Boston Army Base in cinder-fill, and at Mamaroneck, N. Y., through salt marsh. After three years (possibly it was longer for the cinder-fill installation) inspection had revealed no attack of the exterior walls of the pipes.

Van Gilder Voted Fuller Award

At this point, Chairman Hyland announced that the Committee on the George W. Fuller Memorial Award had chosen Mr. A. Lincoln Van Gilder, Sup't. and Engineer of the Atlantic City Water Department, as the member most deserving of the Fuller Award for 1940.

Mr. Van Gilder was cited for his efficient handling and management of the very difficult problem of keeping Atlantic City's system abreast of the rapidly growing resort city where supply requirements and soil corrosion problems had taxed engineering ingenuity.

Technical Session

(Chairman Edward P. Hyland, Presiding)

The Chairman after introducing Warren Cowles, Sanitary Engineer of the Hackensack Water Co., turned the meeting over to Mr. Cowles who presided during the symposium and panel discussion on—

"The Use of Water Supply Areas for Recreational Purposes"

That the program was interesting and productive can be determined from the following array of speakers:

Dr. L. B. Sharp, Executive Director, Life Camps, Inc.

William Banks, Operating Engineering, Newark Water Dep't.

Secretary-Treas.
C. B. Tygert, Wallace & Tiernan Co., Newark

Topic Leader
Warren Cowles, San. Engr., Hackensack Water Co., New Milford

*Frank A. Boland, Counsellor-at-Law, New York City

H. P. Croft, Chief Engr., State Dep't. of Health

W. C. Mallalieu, San. Engr., Jersey City Water Dep't.

Russell V. Black, Consultant, N. J. Planning Board

H. T. Critchlow, Engr. in Charge, State Water Policy Comm.

Mortimer Gibbons, Supervising Chemist, Rahway Water Dep't.

* The only scheduled speaker who did not appear and was not represented by anyone.

C. P. Wilber, Director, State Dep't. of Conservation & Development; also State Forester.

In a Few Words

After hearing the presentations of the several speakers, and the panel discussion following, the gist of what was developed seemed to be that the water works fraternity had inadequate evidence to justify prohibition of the use of water supply sources for recreational purposes, when such

H. P. Croft, Chief Engr., N. J. State Dep't. Health, Trenton

A. B. Anderson Engr., Water Department, Newark

use can be effectively regulated and controlled. Moreover, that where the latter had been practiced such had proved an asset to publicly owned water utilities in the form of good will of the public, and actually a higher degree of safety than prevails under attempted prohibition where such areas are readily accessible to the public. That dangers from recreational use were seemingly more imaginary than real—namely, more in the minds of some water authorities than in fact. That where watershed areas possess potential values for uses other than water supply alone, regulated recreational use offered an added justification for public ownership of water shed areas, and constitutes an added public service to justify the cost of ownership, adequate protection of the supply, and such added purification as might be considered desirable. That the interest of the State at large justified consideration of State ownership of water supply areas and the most effectual use of the water and land. Right now, not only good policy but good sense dictated a common approach to these problems by those responsible for water, woods, wildlife and recreation.

Dr. L. B. Sharp, Exec. Director, Life Camps, Inc., was the first speaker introduced. After revealing what the out-of-doors movement was doing for the youth of America and benefitting the Country at large, Dr. Sharp deplored the scarcity of camp locations within reasonable distances of the large cities, so that boys could spend more time on streams and in sunshine and less on streets. He then cited the fact that acceptable camp sites called for a stream or a lake; and, that such areas contiguous to metropolitan centers were becoming constantly less available, due to water supply use and consequent prohibitions encountered in respect to recreational usage. It was his plea that such restrictions be reduced to the minimum permissible as a "better way of acting for the benefit of our Country," and that every available square foot be used for regulated recreational usage.

William Banks, Division Engineer, Newark (N. J.) Water Department, unable to appear, contributed a prepared discussion which was presented by A. B. Anderson, Ass't. Engineer. Mr. Banks, pointing out the fact that tax-payers were hard to convince that they should be deprived the rights to enjoy a reasonable use of municipally owned water shed areas. Realizing the increasing difficulties of an exclusion policy, the Newark Department had dropped such in 1920 and had established areas in three most appropriate locations for supervised recreational use. The results had thoroughly justified the decision to allow the citizens use of their publicly owned property (300 cars and 1,000 persons being accommodated at one time) and incidentally the opportunity afforded to educate these citizens on the local water supply system and make friends for the Department. From all angles experience had proved the policy a wise and fruitful one, but he thought that they had also been wise in not inviting in the "Tom, Dick and Harrys" by "advertising" the availability of these facilities which might well have been abused.

Wm. C. Mallalieu, Sanitary Engineer, Jersey City Water Department, was prompt to admit that he was one of Dr. Sharp's "scared Indians," but wished to be considered a "friendly Indian." His chief concern were the developments of parks, pools or beaches and playgrounds by private corporations or individuals for profit. Too frequently fly-by-night outfits had put in developments in New Jersey with inadequate preparations to preclude pollution, or where plans had been adequate on paper such were never completed.

In New Jersey, Mr. Mallalieu pointed out, a former law prohibiting bathing in public water supply bodies had been removed from the statute books. To stop such practice the public nuisance law had to be resorted to requiring proof of existing nuisance and not anticipated nuisance. Thus the damage had to be actually done before injunction could be obtained. Mr. Mallalieu suggested the following considerations in setting up control of recreational use of water-shed areas:—

(1) Proof of warranty or necessity

(2) Project plans and locations to be approved by an authority under a strict system of licensing.

(3) Requisite financial ability to complete approved plans.

(4) Guarantees against interference with availability, or damages to quality of waters reaching public water supply intakes.

In respect to suggestion (4) it could be shown that more intestinal organisms reach intakes as the result of bathing, whereas nuisance could not be proved. Apparently what the public and law making bodies couldn't see or smell they refused to be concerned over, or else there would be heard a loud voice in New Jersey against bathing in water used for drinking purposes, and the anti-bathing statute would be returned to the books and enforced by the State Department of Health.

H. T. Critchlow, Engr.-in-Charge, State Water Supply Commission, prevented from attending, was represented by his associate John E. Brooks, Engr. of the Commission,

The Head Table in Action

(1) *Croft busy taking notes on Mallalieu's remarks;* (2) *Croft still at it while Topic Leader Cowles recognizes someone on the floor;* (3) *Cowles appears to be shuffling the deck while Croft (left) and Mallalieu (right) listen carefully to Brook's explanation from far end of table. Gibbons (beyond) looks over his manuscript, because his turn is next.*

who read Mr. Critchlow's paper. The document reviewed the history of the Water Policy Commission since its creation (1929), and the extent of its rather inclusive jurisdiction over the use and allocation of all surface waters of the State and such ground waters as taken for public water supply—industrial well supply developments being excluded from the Commission's jurisdiction completely. His paper then defined the attitude of the Commission in respect to land and water use in recreational developments.

Concerning the public health aspects of water supply developments, Mr. Brooks explained that beyond the use of waters impounded by dam construction, thereby coming under the regulations, the authority of the Commission ended. In respect to permitting bathing in public supply waters in 1932 the Commission had issued a permit to construct a dam for providing a swimming pool, with all sanitary facilities, on the Rockaway River 23 miles above a water supply intake. The permit was later rescinded by the Commission whereupon the owners appealed the case and won in the Court of Errors and Appeals. This case and repeal of the anti-bathing law radically changed the conception of the Commission in respect to its control over bathing and swimming in public water supply streams. A subsequent case involved a permit to develop recreational facilities close above the Jersey City Boonton Reservoir, but precluded bathing. The law requires that the applicant must have control over a 25 ft. marginal strip surrounding the pond or lake created, and was required in this instance to chlorinate the entire flow from the lake into the reservoir feeder stream. The State Supreme Court, deciding on this case, ruled the permit valid and requirements reasonable.

Later in the meeting, Mr. Brooks, to dispel any idea that there might be conflict between the State Dep't. of Health and the Commission, stated that the Commission's regulations had been drafted in conference with the Department of Health, which had given much appreciated cooperation and assistance. He added that what the Commission feels the greatest need of is a competent sanitary engineer on its staff.

Mortimer Gibbons, Supervising Chemist, Rahway (N. J.) Water Department, operating a filtration plant dealing with the most polluted source of potable supply in the State, indicated that he felt that with modern methods of purification provided,

At the Speakers Table
C. P. Wilber, Director, N. J. Dep't. of Conservation, Trenton, and Dr. L. B. Sharp, Exec. Director, Life Camps, Inc., N. Y. City.

recreational use of water sheds was of far less consequence than the problem of domestic and industrial pollution. Supervised recreational developments along the Rahway River above his plant had been more of a help in moderating pollution than a hazard. The only objection was the construction of shallow ponds which encouraged algae and weed growths, hence something of a potential taste

John E. Brooks, Engr., N. J. Water Supply Commission, Trenton

P. S. Wilson Consulting Engr., Glen Ridge

and odor problem, but subject to correction. The principal hazard in all such developments would appear to be the sanitary facilities, with dangers of their break down due to great overload days, entailing the necessity for considerable over design in such public parks and playgrounds, where the load might be anything from 1000 to 20,000 per day on the same sanitary facilities. Inasmuch as filtration and chlorination is acceptable treatment for waters taken from habitated areas, there was nothing tenable in objecting to reasonably regulated recreational usage of supply areas with filtration being considered a "must" before approving of such water-shed usage. Mr. Gibbons indicated that any other reasoning would be based on argument of aesthetic and psychological effects rather than on scientific or technical fact, which the general public is accepting today.

Russell V. Black, Consultant, State Planning Board, in a prepared statement read in his absence, emphasized the fact that Northern New Jersey had available areas for recreational use amounting to only about one-third of the present demand, and that such demand was increasing yearly. The need of water bodies for recreational use, and the fact that such a high percentage of the State's water-shed areas contributed public water supply, meant that water supply authorities should give more consideration to the broad aspects of the situation than the present lack of understanding and willingness to reach a compromise with recreationists indicated. An improved relationship between these two interests seemed essential for the good of all and the prevention of more costly conflict later concerning equitable usage of water supply areas. It was hard to conceive that except in a few instances would it be essential to completely prohibit reasonable uses of water-shed areas beyond that of public supply—and hard to agree that regulated recreational use need be a menace to water safety in this generation of advanced knowledge of and facilities for disposal of human wastes and purification of waters.

Harry P. Croft, Chief Engineer, State Dep't. of Health, turned in his prepared paper unread. He explained that it was largely a statistical record, containing references to the existing New Jersey law on stream pollution control, as affecting public water supply, and the earlier act prohibiting bathing in water supply sources which had been taken from the books by a legislative act of 1927. The Department of Health was thereby without power to prevent bathing, except where trespass could be shown.

Mr. Croft discussed law vs. common sense and the matter of complete prohibition vs. regulated control of recreational use of water-sheds. He stated that when laws were based on defective foundations or were overly drastic they were subject to defeat. Such was the case with the earlier law which deserved modification rather than complete cancellation.

Mr. Croft stated that he had long been surprised and disappointed that no organization of water works operators and managers in New Jersey had seen fit to let its voice be heard or take action in this matter of recreational use of water-sheds and public supply waters. Repeated efforts to get through an act to prohibit swimming in water supply sources

had met defeat. Apparently there was no consolidated opinion coming from water operators concerning limits to be imposed in respect to recreational use of water supply areas and streams.

Lee T. Purcell, Chemist, North Jersey Water Supply Commission, asked by the Chairman to make a statement concerning the Wanaque supply, explained that protection against pollution from real estate developments on the Wanaque shed consisted of sanitary regulations plus chlorination of all streams feeding the reservoir. It was true that some of the homes on the shed maintained swimming pools, but it was deemed better policy to provide stream chlorination than to bring suit without more adequate proof of actual damage to water quality than could be shown.

An Outstanding Plea For an Understanding

State Forester, *C. P. Wilber,* who is also Director of the State Dep't. of Conservation and Development, delivered a brief paper, which to this writer's mind represents the most concise and clean-cut analysis of the dual problem of water supply protection and permissive usage of water-shed areas and reservoirs that has ever been contributed. (So much are we of this opinion that Mr. Wilber's statement is to be reproduced in full in an early issue of this magazine.—Ed.)

So much in line were the statements by Mr. Black of the State Planning Board and Mr. Wilber of the Conservation Department that one might suspect that ideas were exchanged between the two authors. However, this notion was dispelled by Mr. Wilber, after hearing Mr. Black's paper.

Mr. Wilber pointed out that, next to Rhode Island, New Jersey has the greatest population density per square mile of any state—viz. 600/sq. mi. In respect to recreational areas, such as State and Government owned reservations, New Jersey has but 20 acres per 1000 population whereas in contiguous States Pennsylvania has about 175 acres per 1000, New York 250 per 1000.

In any expansion of recreational areas it would be necessary to look to water-shed areas and give due consideration to a program of balanced use (not abuse) of such areas to an extent permissible to enhance their value to the greatest numbers, and therewith spread their costs to an additional public service and probable commercial asset in the way of products of the soil—production of Christmas trees, evergreens, and timber in particular.

Concerning recreational uses of water-sheds, Mr. Wilber pointed out that both *type* and *intensity* of recreation could well be decided and regulated after determining the relative values of various uses, the justifiable cost of protecting the water against such public use, and adequate purification. In this regard it was readily conceivable that acquisition for public ownership, control and development of entire water production areas for the highest benefits to the State at large would prove justifiable in many cases and almost essential in others. Likewise, there can be instances where public ownership with production of timber, recreational usage and water supply will prove a more profitable use of the lands involved than can be attained through private ownership.

M. M. Gibbons, Chemist, Water Department, Rahway

R. K. Patterson, Johns-Manville Corp., New York

Mr. Wilber regretted that it appeared that the controversy between water authorities and those who would make additional uses of water-shed areas was more in the minds of some than could be supported by fact. In his opinion the only questions to be answered are those of economics—

(1) Is the overall cost of water protection and treatment to permit regulated recreational use justified?

(2) Is complete public or state ownership and controlled land and water use warranted as the highest or most economical use?

Especially in New Jersey,—with the State facing a menacing water problem, an appalling wasteland condition, and a serious outdoor recreation situation—it seemed to Mr. Wilber that not only good policy, but good sense now dictated a common approach to these problems by those responsible for water, woods, wildlife and recreation.

N. J. Section to Have Joint Committee to Study Water Shed Usage

At this point Chas. Haydock, Cons. Engr., of Philadelphia and P. S. Wilson, Water Works Consultant of Glen Ridge, N. J., spoke on the topic, suggesting that it seemed a proper subject for committee investigation and study. It appeared more proper to handle the matter through sectional committees rather than a national committee. A motion was made that such a committee be established in the N. J. Section, with the idea of determining future policy and to invite representatives of State agencies and other interests to participate in the work of the committee. The motion was carried and Chairman Hyland as promptly announced that Warren Cowles, who had so effectively arranged the fruitful symposium of the afternoon, was to head the new committee to be charged with fact finding and cooperation with all agencies having interests in water-shed usage.

As far as we are aware this is the first instance of such a committee being established and its contributions can be highly valuable in separating the "mole-hills" from the "mountains" which seem to be holding water supply and recreational interests so far apart.

PREFERS PIPE MAKING TO STOCK EXCHANGE

An interesting story recently appeared in an A. P. release which tells of a Columbia University graduate and member of the New York Stock Exchange, who decided he had rather go to work in a Birmingham pipe foundry making cast-iron pipes than to continue operating in Wall Street.

J. J. Reynolds, Jr., the thirty-one year old pipe maker, sold his seat on the Stock Exchange at a loss of $21,000 and went to work making pipes in Birmingham at $22.70 per week. Says he's far happier at his new work and sleeps and eats better than for some time in the past.

So, Mr. Water Works Man, when you buy cast-iron pipe who knows but that you may have some lengths made by a workman who renounced "easy-money" in Wall Street for a he-man's job, because he thought it a more honorable way of making a living.

It's a good story—and, it wasn't put out by the Cast Iron Pipe Association, either.

POROUS PLATE FILTER BOTTOMS*

Installed Above Existing Laterals at Flat Rock, Mich.

The Author

By LORAN R. STEVENS
FORD MOTOR CO.
FLAT ROCK, MICHIGAN

ABOUT three years ago, when the writer was placed in charge of filtration at our Flat Rock, Michigan, plant, it soon became evident that rehabilitation of the filter was needed.

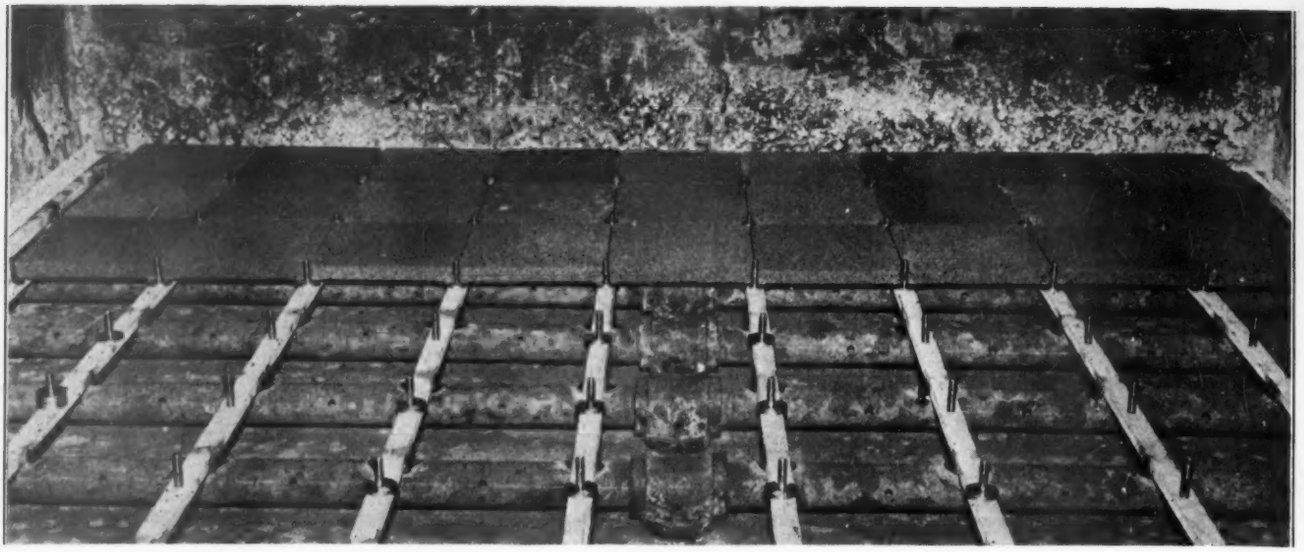
Amongst the several deficiencies, it was apparent that the filters were in very bad condition. When wash water was applied, only that portion of the sand near the front of the filter was being lifted. A mud shelf had formed at the rear of each unit. It extended about two feet out from the wall and the wash water had no effect in this area. Mud balls from ½ to 3 inch diameter were scattered throughout the sand. The lower sand layer was filled with the heavier mud balls.

Complaints of "black water" at consumers' taps were frequent. It should be noted that this was not the result of applying carbon to a filter in good operating condition. It was, on the contrary, first due to the collection of carbon particles in the small mud pellets at the top of the sand. Ineffective wash had then allowed these pellets to grow into mud balls. As they grew in size, they sank into the sand, until finally they rested at the sand-gravel junction. Wash water rubbing them on the gravel abraded them enough to detach carbon-alum

*NOTE: This paper was presented before the Joint Meeting of the Michigan Conference of Water Operators and the Michigan Section of A.W.W.A. It is being reproduced by permission of these two Associations.—Editor.

One of the Completed Porous Plate Bottoms at Flat Rock Plant—Ford Motor Co.

Note the angle iron at the plate ends, bolted to the filter-walls to prevent lifting of the end plates should surge occur under the false bottoms.



Porous Bottom Partly Installed.

Note the ½-in. holes drilled through the side-walls of the laterals in addition to the original orifices in the under side of the laterals.

aggregates which, however, did not rise with the wash water and flow into the gutters. Instead, these particles passed out in the filtered water to reach consumers' taps.

It should be noted at this point, that when occasion arose to clean out the clear well at a later date, about two tons of sand were removed from it. In other words, irregular washing had produced a wholesale disturbance of both the gravel and sand layers with the result that the gravel was not effective for the purposes for which it was installed, namely: (1) to support the sand, and (2) to distribute the wash water evenly.

Decision to Renovate Plant

A review of the situation led to the decision to rebuild the filters so that a higher rate of wash could be applied. This required more freeboard. Lowering the sand surface by installation of porous plate underdrains and discarding the gravel layers offered promise.

Porous plates have been used for air diffusion in sewage disposal plants since 1916. They have more recently been installed in several rapid sand filter plants in the form of porous false bottoms, requiring no gravel layers to procure effective wash water distribution. This scheme appealed strongly to the writer as a marked step forward. At Grand Rapids, Michigan, we had observed that one of the filters, thus equipped several years ago, was in better condition than any of the Grand Rapids filters. The plates were seemingly in as good condition as when installed and had not clogged. Incidentally, the fact that the original installation at this plant had included the old ridge-block filter bottom made the placing of porous plates a fairly simple matter.

Based on our investigation, it was decided to install porous plate bottoms at Flat Rock.

Plate Characteristics

The specifications upon which the porous plates were purchased contained the following requisites:

"The material to be furnished is commonly known as "fused alumina plates." The size of plate required is 11⅞ inches square and 1¼ inch thick."

"The pore size shall average 0.4 mm. diameter and in no case shall exceed 1.0 mm."

"Each plate shall have such permeability that air applied at 2 inch pressure will pass through the plate at the rate of 50 cubic feet per minute. Plates, the permeability of which is not more than 10 per cent higher or lower than the 50 c.f.m. per plate, will be accepted."

(This specification for permeability is such as to provide a plate through which the head loss will range from 6 to 10 inches with water flow at 20 gallons per square foot per minute, such as is the condition during filter washing.)

Porosity and permeability must not be confused. The term "porosity" refers to free space within the plate, while the term "permeability" refers to the capacity of the plate to diffuse air or water evenly through the free space. This, along with limitations as to average and maximum size of opening, governs evenness of distribution of flow, etc.

Solubility Tests

Certain tests of plates were made. Dr. G. E. Symons, of the Buffalo (N. Y.) Sewage Disposal Plant, made tests of solubility of the plates under consideration. The results follow:

Solvent	Ground Sample 9-12 gms. Loss	Solid Sample 36-50 gms. Loss
Distilled water	0.016%	0.0045%
Tap water	0.003%	0.0016%
21% HCl	0.0645%	0.026%
21% NH_4OH	0.023%	0.000
48% Chlorine water	—0.01%	—0.0042%
57.6% Chlorine water	—0.0143%	—0.0011%

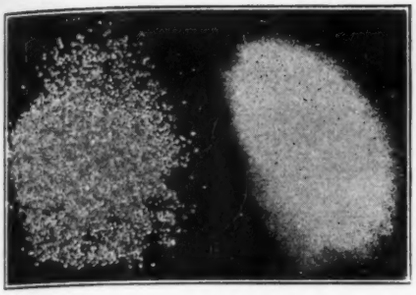
It may be noted that the materials used for the test were, with the exception of tap water, of a character not likely to affect the life of a porous plate when used as a filter bottom. However, the tests were purposely made severe.

The solubility tests indicated a probable life of 175 years for the plate, given no other factor in depreciation than a solvent.

Loading Tests

Certain loading tests were made—all with the plate supported at the four corners, with a total support surface of but two square inches.

With the load applied at the center of the plate, within an area of ¾ sq. in., the plate failed at a 1360-pound load. With the load applied over a 72 sq. in. area about the center of the plate, the plate failed at a 1600 pound load. The load capacity of each plate is assumed to be 2000 pounds under distributed load conditions, such as found in a sand filter.



Sands Employed

Immediately above the porous plates was placed 3 inches of torpedo sand and then 30 inches of 0.52 m.m. sand of high uniformity.

Sand was screened to pass a 30 mesh screen and remain upon a 40 mesh screen. A 3 inch layer of this material was placed on a plate and water allowed to flow downwards through the sand and the plate for 24 hours. Occasionally the plate was agitated. At the end of the period the plate was broken. A few grains of sand were found to have penetrated ¼ inch within the plate but they were easily dislodged by a flow of tap water.

Installing the Plates

The filters had originally been built with 16 inch headers placed below the concrete floor of the unit. Three inch riser pipes were installed on 12 inch centers. At the top of these risers, 2½ inch tees were installed and the 2½ inch laterals fitted into them. The laterals were drilled at the bottom with ½ inch holes spaced on 6 inch centers.

At first it was intended to remove the laterals and the tees, leaving only the riser openings up through the floor from the header. This plan involved the installation of a series of cast iron supports (or chairs) upon which it was intended to place the porous plates.

However, these castings were not employed, because it was decided to make use of the distributing laterals and anchor the plates to these useful pipes. Furthermore, it was a less costly method.

When the underdrains were exposed, it was found that they were in good order and could well be used to support the plates. They were drilled with additional ½ inch holes along the side or 6 inch centers.—See accompanying view of partially completed bottom.

To these laterals were welded 1½ inch by ½ inch cadmium plated cold rolled steel bars with ½ inch tapped holes on 12 inch centers. Cadmium was used for plating these bars because of its faculty for healing over the welded spots. A cadmium plated angle iron was bolted to the filter walls to close any possible gap around the edge of the plate bottom, and to hold down the plate ends against lifting by high wash water.

Phosphor, bronze bolts, washers and nuts were used to hold the plates. The washers were 2 inches wide by ¼ inch thick. The plates rest upon the washers (see cut) so that very little of the plate area is lost as a filtering medium. Not more than 8 square inches of the total 144 square inches of each plate is lost in this method of anchoring.

It was decided to use a mixture of one part cement to two parts sand as a grout to seal the joints between plates, rather than to employ a plastic compound.

After installation the plates were kept wet for 48 hours and nothing further was done until the cement had hardened. Then the filter was washed to note wash water distribution. It was perfect. No one part of the filter got wash water at the expense of another part.

Gravel Omitted

Then a 3 inch layer of torpedo sand (0.8 to 1.2 mm. diameter) was put directly on the plates as a factor of safety against possible pore plugging by the smaller grains. Atop that was placed a 30 inch layer of filter sand with an effective size of .52 mm. and a uniformity coefficient of 1.2. The freeboard had been thus increased 11 inches, giving that much more room for sand expansion.

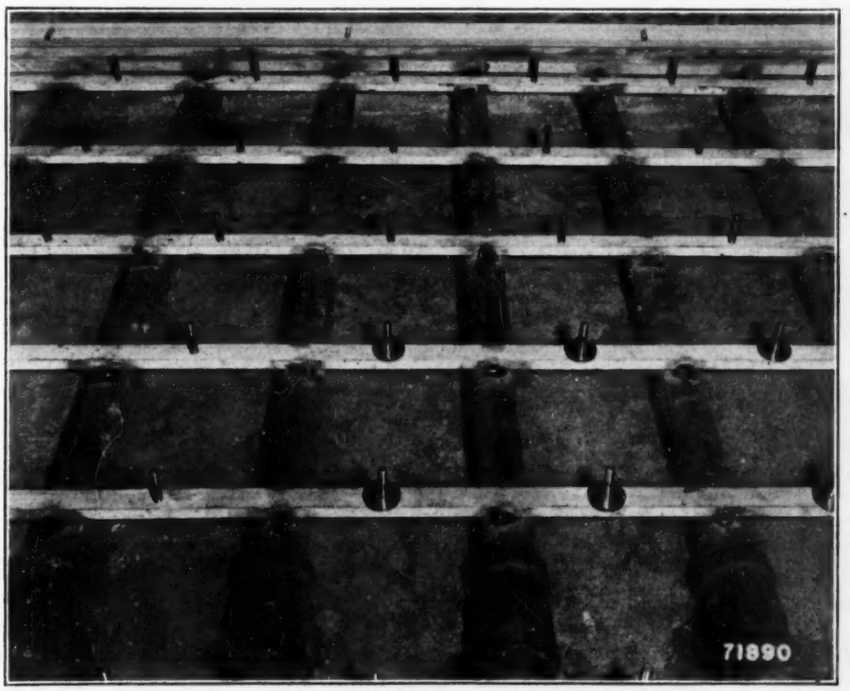
An entirely uniform expansion of sand and a higher wash water rate, with perfect diffusion of wash water throughout the whole filter area, has been obtained. From an expansion of approximately 40 per cent in a limited area in the center and toward the front of the filter unit the expansion has been increased to over 50 per cent evenly distributed over the entire filter area.

The rate controllers and other items of equipment have been put in good condition. The clear well has been cleaned and operating results have vastly improved.

Conclusion

Wherever operating conditions in a rapid sand filter are such as to prevent the proper washing of the entire area, the installation of porous plate underdrains seemingly offers a happy solution.

Not alone is it possible to increase freeboard, increase wash rate and secure better distribution of wash water, as a result of having installed the porous plates, but there has been permanently removed from the plant the problem of the gravel layer. Far more filter ills may be traced to deficiencies in a gravel layer than is often suspected. Porous plate bottoms, as a substitute for the gravel, to the writer's mind, have much to merit their consideration.



Closer View of the Scheme

Bars of cold-rolled 1½ x ½ inches cadmium plated are welded to the laterals. The stud-bolts, washers and nuts are of phosphor-bronze. Plates come with corners properly shaped to fit around the bolts.

AIR–WATER COMBINATION WASH

Cures Filter Headaches Through Effective Sand Scour

Frank

From F. C. AMSBURY, JR., Sup't.
Illinois Water Service Co.
CHAMPAIGN, ILLINOIS

Dear Len:

I was greatly interested in a letter you wrote to Bob relative to your experiences in Mattoon and it brought to mind that you might be interested in an experience we have had in the operation of our iron removal plant.

You have seen this plant so I won't spend much time in giving you a description, but will only refresh your memory a little.

Our source of supply, as you remember, is a well system. The water delivered from the wells contains 2 parts per million of iron. This gave us so much trouble in roily water and iron bacteria growths, that in 1912 under the direction of Prof. A. N. Talbot, of the University of Illinois, a study was made, and the iron removal plant built.

To try to tell you all of the obstacles which arose in the operation of this plant, and the solutions of each one would require a book. To cover this period of 1912 to 1920 in a few words, operation during these years indicated that the proper procedure was to aerate, prechlorinate, filter and post-chlorinate.

Higher Wash Rates Tried

You may remember that about this time (1920), extensive research was being conducted along the line of increasing the back wash rate. Our filters doing only a fair job of iron removal, leaving in the water an average residual of iron of about .75 P.P.M., the plant was redesigned so the wash rate could be increased from 12" to 24" rise per minute.

Maybe you have seen the sand at our plant that had been in use for a year or more. The sand grain growth was phenominal, ordinary sand growing to the size of a very small green pea. The 24" rise did not help our problem, the sand continued to grow and the efficiency of the iron removal did not get any better.

The answer to this problem seemed to be poor cleaning of the beds. If the sand grains could be thoroughly cleaned during each wash, we felt that our iron removal problem would be solved.

The character of this growth was such, that to get any kind of cleaning at all, we always have had to use air wash regardless of the rate of rise used.

During the washing operation after the air was turned off and the wash water cleared up so the action of the sand could be observed, the sand seemed to be suspended, each grain individually in the wash water. The thought resulting from this observation was, why not wash at a very low rate which would not expand the bed, and with the air wash turned on let these sand grains grind against each other thus scouring themselves.

We Experiment: It Works!

In 1934 we started in on this theory. The filters were drained and the water and air wash started together. The rate of back wash was held down to a 6" rise. The wash was continued at this rate until the water reached the wash water troughs, then the air turned off and the wash rate slowly increased to the full 24" rise, which flushed the beds clean.

It worked, and has been standard washing practice in our filter plant now for five years! In an acid digestion the sand that had been in service for a year, was reduced in size 21% before this method of wash was adopted. With the new method of wash, after the same period of service the reduction in the size of sand grains was only .01%. Total water required for washing was reduced from 6% of the total pumpage to less than 2%, and the average iron content in the effluent of the plant for a year's period was only .0022 parts per million, (maximum .05, minimum .00).

Maybe this idea won't do you any good and what works at one plant may not hold at another, but you may know of someone that has had similar troubles and if so maybe this idea will save him several years of headaches.

Sincerely,

FRANK.

HAL SMITH WINS PROMOTION

Succeeds Dan Grobbel, Retired

Dan C. Grobbel retired from active service in the Water Department of Detroit on March 1st, after more than 39 years of service. In that period Dan Grobbel rose through the ranks from Inspector to Office Manager and Senior Administrative Assistant in the Department.

To this position Hal F. Smith has been appointed, the promotion taking him from the position of Superintendent of Customers' Accounts. Mr. Smith has been in the employ of the Detroit Water Board since 1918. He has long been an active member of the American Water Works Association, which in 1939 awarded to him the coveted John M. Diven Medal, "for outstanding services to the Association." This award was made in recognition of his work in connection with the development of the "Manual of Accounting," produced jointly by A.W.W.A. and the Municipal Finance Officers Association, of which Hal is also a member.

THE NEW TREATMENT PLANT OF HIBBING

Features of Which Are the 150 Ft. Dome Filter Enclosures; Pre-Flocculation of Sewage, Aided by Secondary Sludge Return

By CHARLES FOSTER
Consulting Engineer
DULUTH, MINNESOTA

THE sewage treatment plant for Hibbing, Minnesota, has just been completed and was placed in service on December 15. This plant is typical of the many complete and modern plants which have been constructed by communities during the past few years as a PWA project which financial aid from the Federal Government made possible.

Hibbing, with a population of 16,000 people, is the iron-ore mining center of Northern Minnesota. It is a typical residential community with a few small industries, contributing but a minor amount of industrial waste.

The sewers for the community were, at first, largely combined sewers but are now mostly separated. Considerable water pumped from some of the mines is delivered to the storm sewers.

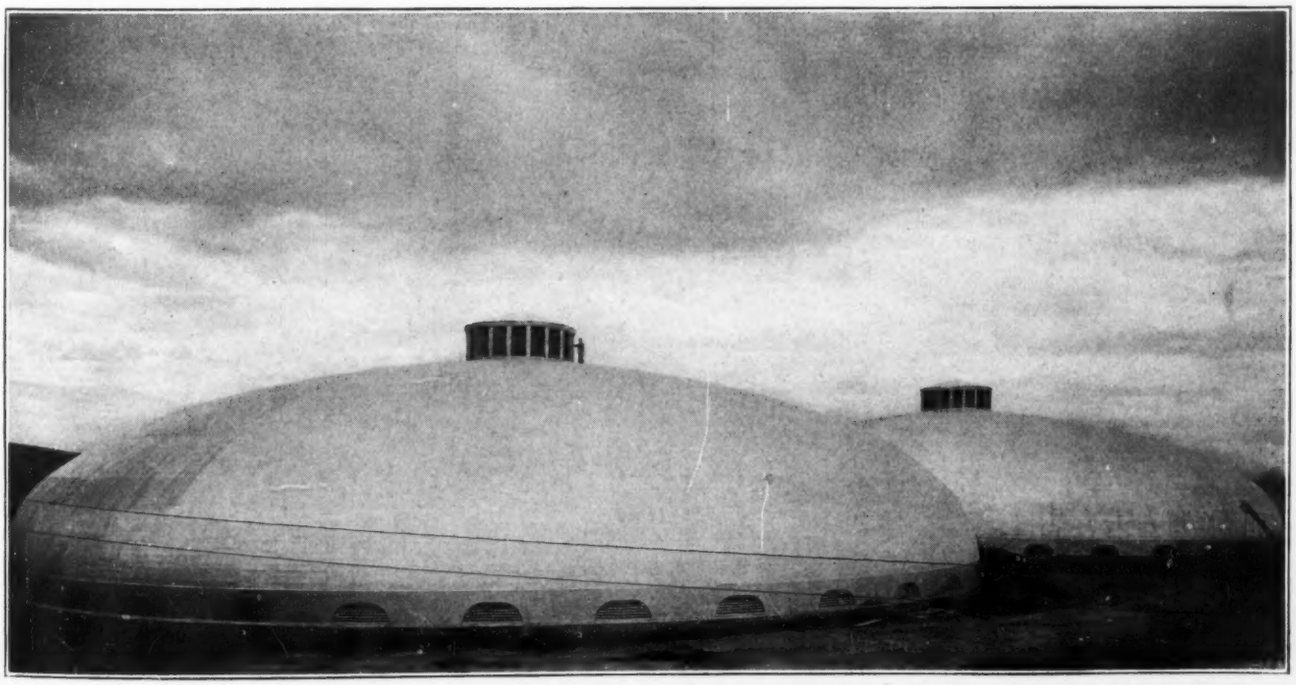
The Author

For several years the City Health Department has urged the construction of a sewage treatment plant, because the only outlet for Hibbing's sewage was to a small creek which, at times, became a nuisance and resulted in many lawsuits and damage claims by residents and riparian owners down stream.

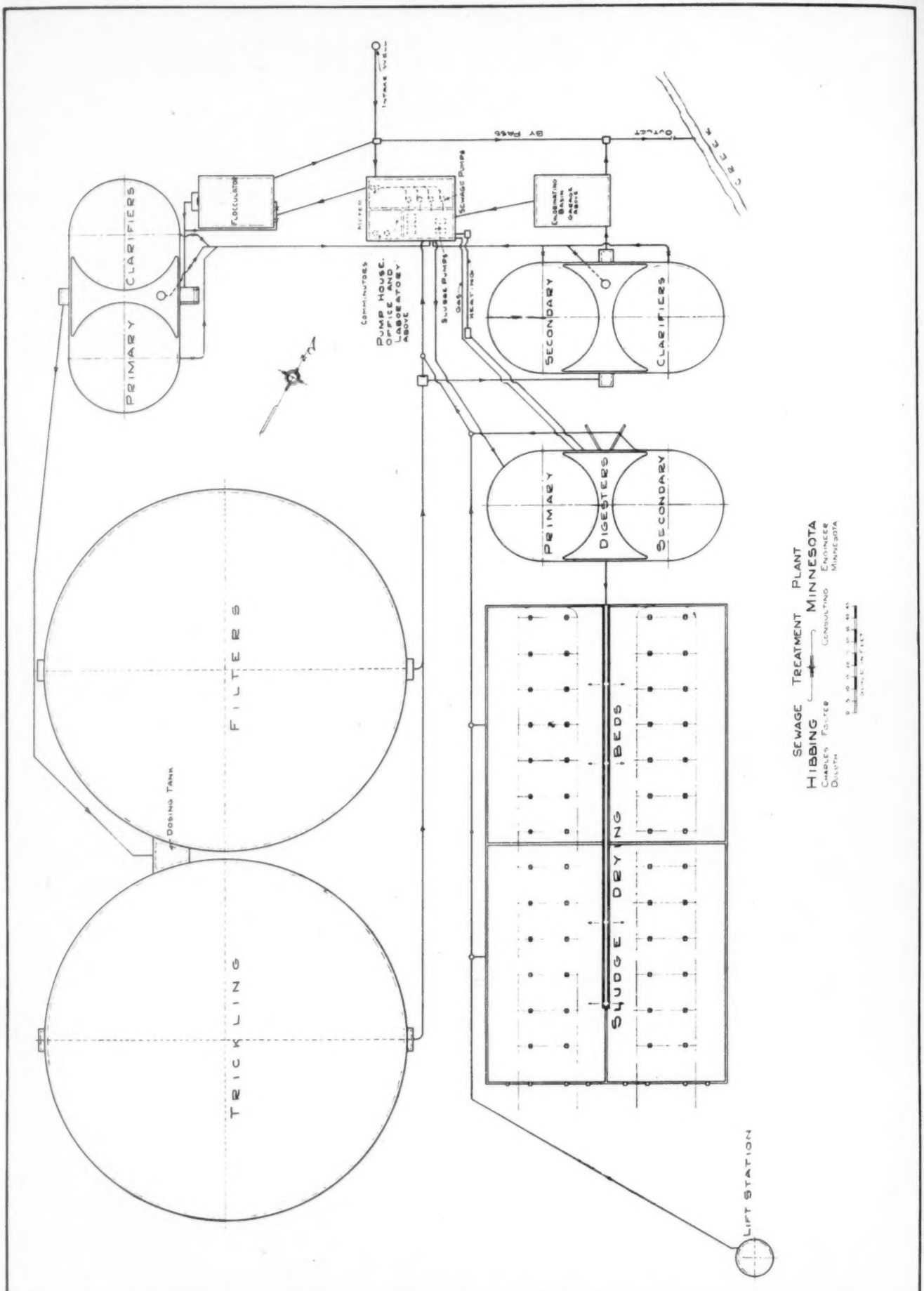
In 1938 preliminary plans and cost estimates were made. Application made for a PWA grant was approved and the required funds were raised by bond issue which received the voters' approval. Plans were prepared for intercepting and trunk line sewers to collect all sanitary sewage and convey it to one point for complete treatment.

Intercepting and Trunk Sewers

Preliminary studies showed that the best and most economical site for a treatment plant was in the easterly portion of the village to which all of the sewage, except that from one small section, could be delivered by gravity. The selection of this site necessitated the construction of the following lengths of intercepting and



The Most Distinctive Units of the Plant—Hibbings Twin Domes Under Which Are 150 ft. Diameter Trickling Filters.
(These unique thin shell concrete domes are the largest "Z-D" Domes yet built in this Country. See also interior view.)



General Layout of the Treatment Plant of Hibbing, Minn.

trunk line sewers of reinforced concrete pipes:

2200 ft. 48 inch.
1210 ft. 30 inch.
2422 ft. 36 inch.
1670 ft. 15 inch.

And a 2000 ft. line of 8 inch vitrified clay pipes.

To cross two of the main storm sewer lines and a small creek, inverted syphons were used. Class "B" cast-iron pipe with leaded joints was used, there being nothing difficult or special in this construction.

Location of Treatment Plant

The treatment plant is located at the outer eastern boundary of the community near the receiving creek.

The plant site is an ideal one from the standpoint of isolation from the residential districts and also an excellent one from the standpoint of topography and nature of the ground. This made possible the selection of a type of plant best suited to the conditions and to the economies of both construction and operation.

The population immediately tributory to the main sewer system and the outlying communities was estimated at 18,000 persons. There being no prospect for any considerable increase in population, the plant was designed for a population of but 20,000 persons, normal flow of 2,000,000 g.p.d., and maximum of 2,750,000 g.p.d.

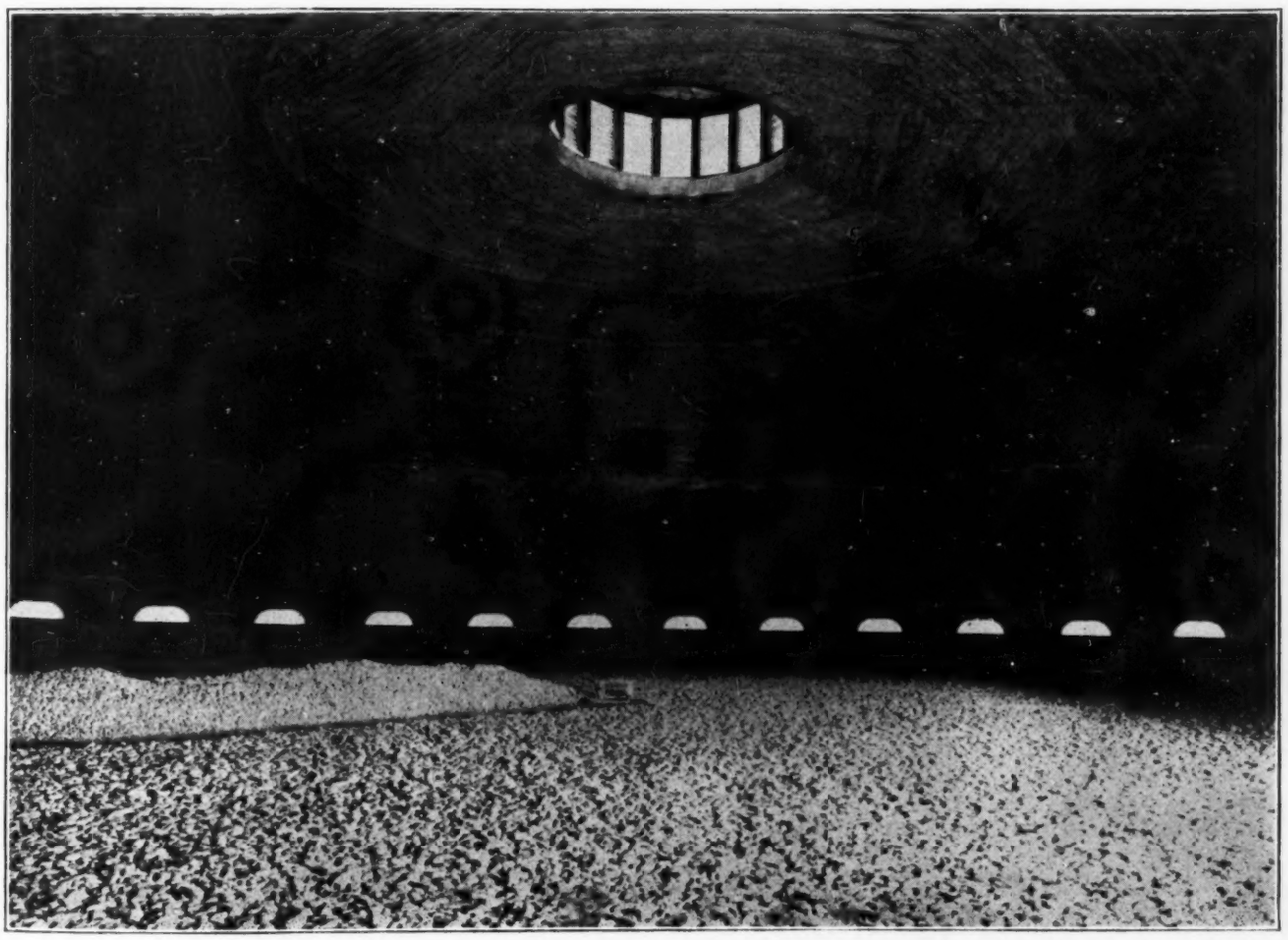
The Plant

The conditions affecting the degree of purification necessitated complete treatment. The type of treatment selected was pre-flocculation without chemicals at present (possibly with chemicals at some future time), primary sedimentation, trickling filters, secondary sedimentation, separate sludge digestion, and chlorination. Studies revealed that for complete treatment of Hibbing sewage such a plant would prove the most economical from the standpoint of operation and overall costs of providing high-degree of purification.

The plant includes, in general, intake manhole with sluice gate and bypass to outlet; two Chicago Comminutors, arranged for bypass through a bar screen; four crude sewage pumps; a Venturi meter; one flocculator; two circular primary clarifiers; two trickling filters; two circular secondary clarifiers; two stage (primary and secondary) sludge digesters; a gas holder on one digester, and full gas collection and utilization equipment; sludge drying beds; chlorination equipment and contact basin for the final effluent.

The sewage enters the plant from the main interceptor sewer, passes through the Comminutors, and is discharged to the wet well.

Flocculator:—From the wet well the sewage is pumped through the Venturi meter to the flocculator which provides a 30 minute period of mechanical flocculation. This unit is used without chemicals for partial coagulation of the raw sewage, to which sludge from the final clarifiers is delivered. The flocced sewage discharges to the twin primary clarifiers, each of which is 45 ft. in diameter and together provide a two hour settling period. The clarifiers are provided with valved inlet and outlet to allow either unit to be cut out of service should repairs be needed. These units may be emptied through the sludge outlet.



Interior View of Filter Before Installation of Revolving Distributor.
(From the stone surface the elliptical span of 150 ft. rises to 32 ft. at highest point.)

The clarified sewage flows to the dosing syphons, which are designed for continuous discharge at full flows and for intermittent discharge at low flows.

Trickling Filters:—The two trickling filters are each 150 feet in diameter and contain 8 foot-0 inch depth of 2½ inch by 3½ inch crushed rock. The underdrains are "Armcre" vitrified blocks. An inspection and ventilating gallery extends across each bed through the center. Each filter is equipped with a four arm revolving distributor, with openings spaced and sized to distribute the flow as evenly as possible over the entire stone bed.

From the trickling filters the sewage flows by gravity to the twin circular secondary clarifiers 45 feet-0 inches in diameter and designed for a 1½ hour settling period.

The sludge is removed from both primary and secondary clarifiers by plunger type pumps. The primary sludge is delivered to the digester and the secondary sludge to the raw incoming sewage entering the flocculator.

Digesters:—The digesters are two in number, each 45 feet in diameter by 20 feet in depth. The secondary digester is equipped with a gas holder which has a storage capacity of 13,000 cubic feet. The top of the cover is insulated with 1 inch insulation and composition roofing. The control house is located between the two tanks, especial attention being given to ventilating facilities. Each digester is provided with heating coils.

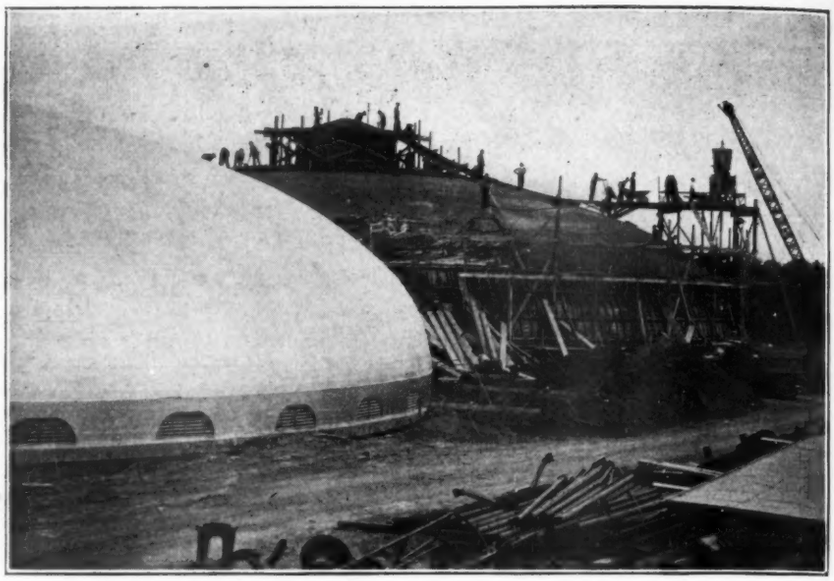
The digested sludge will be discharged to the open sludge beds having an area of approximately 1 square foot per person.

Gas Utilization

The gas collected will be burned in two hot water boilers located in the pumphouse. The gas lines are provided with meters, flame traps and waste gas burners. The boilers are used to furnish heat for the Administration Building and for heating the digesters.

Superstructures

Superstructures are provided for all clarifiers, trickling filters, flocculator, chlorinating basin, and the pumphouse. The superstructures for the flocculator and clarifiers are used as enclosures and for protection. The superstructure over the chlorinating basin is used as a garage and storage space. The superstructure over the pumphouse is divided into rooms providing space for laboratory, office, toilet and equipment room. All of the above superstructures are of monolithic concrete of modern design.



A Construction View of the Domes.
(Note the use of exterior forms on the lower 12 ft. of the shell only.)

Z-D Domes Over Filters

Over the two trickling filters, each 150 feet in diameter, are constructed monolithic reinforced concrete domes of the unique and economical "Z-D" type designed by Roberts & Schaefer Co., Engineers, of Chicago. The dome height is 33 feet 5 inches at the center, not including the lantern. The shell thickness of the domes varied from 6 inches to 3½ inches and each contains 334 cubic yards of concrete. The outside of the domes was first painted with two coats of emulsified asphalt followed by one coat of aluminum paint.

The design features of the "Z-D" domes are their low height and permissive wall thinness for strength required, no thrust at base, less dead weight, and maximum economy of materials. This is all brought about by the eliptical, rather than spherical cross section. It will be noted in the accompanying picture that exterior forms are required only for the lower 12 feet of the shell, which is only 6 inches thick at its thickest point and tapers to 3½ inches at the top.

Domes were provided for these filters primarily to prevent ice formation on the filters. Experience has shown that if filter beds are provided with proper enclosures practically no ice will form, even at the very low temperatures met with and prevailing for considerable periods in this latitude. If chilling and ice formations are prevented, a higher efficiency is obtained during the period of low temperatures. This, of course, gives a greater overall plant efficiency record for the year.

Likewise these enclosures prevent interfering effects of high winds striking the great expanse of the four revolving distributor arms on filters of such large diameters as 150 feet. And also the filter fly and odor nuisances can be effectively dealt with by enclosing trickling filters.

All landscaping will be done during 1940 after the fills and grades have settled.

Makes of Equipment

Equipment	Manufacturer
Flocculator	The Dorr Co.
Primary Clarifiers	" " "
Secondary Clarifiers	" " "
Sludge Digesters	" " "
Trickling Filters	" " "
Sludge Pumps	" " "
Comminutors	Chicago Pump Co.
Sewage Pumps	Dayton-Dowd Co.
Motors and Control	Gen'l Electric Co.
Chlorinator	Wallace & Tiernan
Sewage Meter	Bailey Meter Co.
Heating Boilers	American Radiator Co.
Flame Trap & Waste Gas Burner	Pacific Flush Tank Co.
Valves in Sewage Lines	Van Nordstrom Co.
Gas Meter	Pittsburgh Meter Co
"Z-D" Domes	*Roberts and Schaeffer Co.

*Consulting Engineers, Chicago.

The total construction cost for the plant and interceptor sewers was $382,763.87, of which the plant was $311,668.09.

Direction

The sewage plant was a PWA project for the Village of Hibbing. Charles Foster, Duluth, Minnesota, was consulting engineer on the project and J. C. Taylor, Hibbing, Minnesota, was architect. W. C. Jones was resident engineer-inspector for PWA; James H. Rough is village engineer and Roy C. Pascoe was project engineer. E. W. Coons Company, Inc., of Hibbing, was general contractor.

[At this writing operating results are too limited to justify their publication. In consequence this general description of the plant, which involves as distinctive features preflocculation ahead of trickling filters enclosed by thin shell concrete domes of unique design, for a combination of effects, is presented by the author at this time. Operating results comparing winter and summer performance will be presented in a follow-up article by Mr. Foster in due time.—Editor.]

NEW JERSEY'S SILVER ANNIVERSARY MEETING ALREADY LOOKS LIKE A SELL OUT

FROM all recent reports the Silver Anniversary Meeting of the New Jersey Sewage Works Association shows every indication of drawing larger numbers to Trenton, N. J., on March 20, 21 and 22 than had been anticipated.

Those accustomed to gauging the probable attendance at meetings predict an attendance almost tripling that at previous meetings of this, America's oldest sewage works association. The headquarters hotel (The Stacey Trent) has for some time now been sold out for the meeting and is referring requests for rooms to the Hildebrecht, less than a block distant.

In our last issue we printed the well rounded out Technical Program, which carried names of speakers that made the listing look like a "Who's Who" amongst sanitary engineers—for instance, Wolman, Mohlman, Gascoigne, Levine, Hansen, Potts, Downes, Bachmann, Cohn. However, the Jersey operator is not without his day—that being devoted to a number of practical papers by operators of ten New Jersey plants, with a Panel Discussion following.

A feature on the program is the topic "Where Do We Go from Here?" This is another way of saying that *"The Need for a Strong National Sewage Works Association"* is to be discussed by W. J. Orchard, who has taken on the job of heading up the Silver Anniversary Convention Steering Committee in his reputed manner of handling convention arrangements for the American Water Works Association. It is no secret that Orchard believes that the time has arrived for the consolidation of the many regional groups, which now form a loosely knit Federation, into a strong National Sewage Works Association.

Orchard reminds us that it was 12 years ago practically to the day of the coming convention that it was in Trenton that the Federation of Sewage Works Associations was organized. The Federation scheme, having served a highly useful purpose, should now be converted into a National Association in the mind of Orchard, who had considerable to do with the launching of the Federation and its commendable *Sewage Works Journal,* and likewise in the minds of others who have given thought to the matter. Many who represent various member associations in the Federation will be on hand to discuss the pros and cons of such a move which has already been considered by the Board of Control of the Federation.

"A Big Show" seems the most appropriate term for what is developing in the way of Manufacturers' Exhibits for the Convention, such being handled by Chas. Becker and Bob Mowry who seem satisfied that all available space in the large exhibit hall will probably be sold out before this account gets into print.

As to entertainment, much that is novel is being arranged by P. N. Daniels and Jo Wafer. All registrants are guaranteed a full money's worth production by these two old hands at the game from the opening "Get Together" to the "Last Round-Up," which closes the convention in a novel manner.

Yes, the New Jersey Silver Anniversary Convention has all the earmarks of passing expectations of those who predicted that it would be the biggest sewage works meeting ever to be held in this country, if not the world.

At this writing exhibits space has been taken by the following firms:

Activated Alum Corp.
American Brass Co.
American City
Builders Iron Foundry
Carter Co., Ralph B.
Chain Belt Co.
Chicago Pump Co.
DeLaval Steam Turbine Co.
Dorr Co.
Engineering News Record
Fairbanks-Morse Co.
Inertol Co.
Industrial Chemical Sales
Kingston Trap Rock
W. A. Laughlin
Link-Belt Co.
Mathieson Alkali
James Maskell
Johns-Manville
Mine Safety Appliance Co.
Municipal Sanitation
Pardee Engineering Co.
Pennsylvania Salt Co.
Pacific Flush Tank Co.
Pittsburgh Meter Co.
Jos. G. Pollard Co.
Public Works
Tapax Mfg. Co.
Arthur H. Thomas Co.
U. S. Pipe & Foundry Co.
Wailes Dove-Hermiston
Vapor Recovery System
Wallace and Tiernan
R. D. Wood Co.
Water Works & Sewerage

AN EDITOR THAT ROSE TO THE OCCASION

The following has come to us as a reproduction of an editorial which appeared in the first issue of the Rocky Mountain Cyclone in 1888.

The editor of the Cyclone issued his first edition under trying circumstances, the supply house from which he purchased his fonts of type, having "shorted" him when it came to certain letters, which necessitated the following explanation:

"We begin the publication ov the Rocy Mountain Cyclone with some phew diphiculties in the way. The type-phounder phrom whom we bought our optphit phor this printing-ophice phaled to supply us with any ephs or cays, and it will be phour or phive weecs bephore we can get any. We have ordered the missing letters, and will have to get along without them till they come. We don't lique the loox ov this variety ov spelling any better than our readers; but mistaixs will happen in the best regulated phamilies, and iph the ph's and the c's and x's hold out, we shall ceep (sound the c hard) the Cyclone whirling aphter a phasion till the sorts arrive. It is no joque to us; it's a serious aphair."

MAINE WATER UTILITIES ASSOCIATION

Meets in Portland for 11th Consecutive Year

FOR the 11th consecutive year the Maine Water Utilities Association held its Winter Meeting on February 13th and 14th in the modern and very complete Service Building of the Portland Water District which serves to accommodate manufacturers' exhibits, provide meals and a room for the technical sessions all under the same roof.

The first afternoon was devoted entirely to shop talk, here and there, and an ample opportunity for inspection of the wares of manufacturers who enjoy the privilege of exhibiting at no cost for space. That evening, as in past years, the Portland Water District (hereafter referred to as P.W.D.) was supper host to members, guests and employees of the District. Long to be remembered was the Maine style chowder and doughnuts supreme. After supper there was entertainment by the reputed hill-billy orchestra known as "Them Maine Montaineers," assisted by P.W.D.'s artist extraordinary with the bones — rangy Harry Murch, Chief Watershed Inspector. (Fact is, we think, Harry stole the show). Then followed a humorous skit by P.W.D. employees—"Can You Beat That One?" — which featured humorous telephone conversations between the complaint clerk and customers having a grievance, and the reading of complaint letters as funny. And, it being Valentine's Day, several prominent members of the Association received humorous Valentines which were purportedly intercepted and read aloud by a nosey Complaint Clerk.

1st Technical Session

Fred. J. Reny, Gen'l Mgr., Portland Water District, Presiding

"Results from Ammonia-Chlorine Treatment of The Portland Supply"

Following the hour of entertainment, Mr. Reny introduced P.W.D.'s Chemist, *Harold B. Scales,* who briefly reviewed 18 months of experience with chloramination at Portland.

Mr. Scales explained that for the greater part of the time the Portland supply is so free of organic matter that its tolerance for chlorine, without producing chlorinous taste, was extremely low and the margin between adequacy of chlorine residual and taste complaints an extremely narrow one. As a result, "Chlorine Cocktails" served consumers at times had been the choice between the taste evil and the possibility of inadequate chlorination. Even so, at points on the extensive P.W.D. system where residual chlorine could not be maintained bacterial counts in uncomforting numbers and frequency appeared as so-called after-growths to harass those responsible for water quality and make a bad looking record, regardless of their sanitary significance.

D. A. Moulton, Atty., Portland Water District (President for 11 years.)

S. S. Anthony, Sup't. Augusta Water Distr. (Association Editor)

Starting cautiously with very low ammonia dosage in the beginning and gradually increasing it while reducing the chlorine to preclude too high residuals, which ammoniation produced with each step up in dosage unless the chlorine was cut, Mr. Scales reported nothing but enthusiasm for the results.

Even now the treatment was continuing to increase in effectiveness, with residual chlorine maintained at great distances out in the system and no complaints of tastes. In comparing bacterial results on tap samples involving 7,000 examinations of 10 cc. portions annually, Mr. Scales reported: 1933-1939, 109 tubes positive for E. Coli as the yearly average. Taking 1938 and 1939 the comparison was 141 tubes positive as against only 1 tube in 7,000 positive in 1939. As to total bacteria, 2 per c.c. was the maximum recorded in 1939. Mr. Scales explained that the observed benefits from ammoniation did not appear over night but were very gradual, even during the present winter the results indicating the treatment to be doing a better job that at any time since its introduction.

Hydrant Chuck of Civil War Days.
(Portland's Entry in Antique Exhibit.)

In explaining the procedure followed, Mr. Scales emphasized the fact that the start was made with a very low ammonia ratio (1 ammonia to 10 of chlorine), and after a time stepped up gradually over a 6 month period to 1 to 7. They had decided to hold to that very satisfactory ratio. Mr. Scales ventured the opinion that operators finding ammoniation disappointing, or creating troubles from the killing and sloughing off of pipe-wall growths, has perhaps been too much in a hurry to obtain results and had likely used an ammonia-chlorine ratio more nearly the theoretical (namely 1 to 4) right at the outset, with the consequential build up of killing residual and its reaching out into the system where living growths exist due to the fact that residual chlorine has heretofore not reached those sections.

"The Portland Water District in 1908 and Today" by HARRY U. FULLER, Chief Engineer, Portland Water District.

Mr. Fuller's highly interesting review told of the progress and gains made in facilities, finances and assets of the efficiently managed and operated Portland Water District, during the 32 years since its creation to take over the run down and inadequate properties of the privately owned Portland Water Works. (Perhaps nowhere in America is there to be found any more impressive example of public acquisition of a water

utility, since managed and operated for 31 years without political dictation and strengthened structurally and financially for the benefit of the people, and several benefiting communities which have during the intervening years asked participation in the Water District's program.—EDITOR.)

The high lights of Chief Engineer Fuller's review revealed that the 200 odd miles of mains and 12,000 services of 1908 had been doubled in the 30 years (1908-1938) to 428 miles of mains and 23,000 services. More impressive than the comparative mileage of the so-called mains of 1908 and mains of 1938 was the increased value and capacities of the mains. That is, considerably more than the apparent increase of 228 miles are new mains, due to the replacement of a considerable mileage of "supply pipes" with pipes of 8 and 6 inch size to eliminate hundreds of the "red-top" hydrants of Portland and provide first class fire service.

Metering had been instituted on a wide scale only in 1923. During the ensuing 5 years metering had been practically 100% completed by 1928, with only a slight increase possible since—this fact being pictured by graphs.

As to revenues, the $300,000 income of the first year of public ownership had been increased to $620,000 in 1938 — better than a 100% increase.

Revenue from hydrant rentals and the inch-mile basis of charging for fire service in the 17 rate divisions of the District had grown to $33,000 for the year 1938 in contrast to the $8,000 total collected in 1908, the four-fold increase reflecting comparative values in hydrant ratings (main capacities) accruing in the 30 year interval. The old Portland main system proper had been increased very nearly 100% in value—actually 92% —a figure revealing conditions of the system when taken over by the District. An interesting lot of figures cited were those revealing invested capital per service in the 17 different rate districts, and indicative of the density of population as effecting costs of adequate distribution facilities to communities. The lowest investment per service was, as to be expected, in the central district of Portland proper, amounting to $370 per service. The highest was $1,600 per service, caused by an expensive submarine main to supply the Island District.

Earle A. Tarr, Sup't. Winthrop Water Distr. (Secretary of M.W.U.A.)

Bert McIntyre, Eng'r. Holton, Maine (Member who travelled longest distance to the meeting.)

As to equities in the entire system, such had grown from zero in 1908 to $4,700,000 today, without any increase in water rates during the 30 year period. The present invested value in the improved system, including supply works and supply mains, now amounted to something better than $7,000,000. The original debit of $4,700,000 had been paid off and the remaining debit for the most part represented improvements of a major value, completed as Federal aid projects in recent years to serve for many more to come.

Taking it all in all, as we see it, Portland in taking over the properties of the private water company purchased a going value but it was largely the "going" part that was paid for and the value had to be largely put into the system since. On this score the Portland Water District story is the more impressive when it is realized just how much of the system of 1908 had to be essentially scrapped and still the original debit of $4,700,000 retired in 30 years out of revenues, whereas the $2,700,000 new debit represents only recent investment in improvements, subject to very slow depreciation and obtained under the most favorable of circumstances. (Certainly the Portland Water District under the Board of Trustee control and guidance, and efficient engineering and business management, is a success story that confirms the worth of the method and points to what can be accomplished in the way of public utility ownership and operation when kept free from political interference.—EDITOR.)

Harold B. Scales Chemist Portland Water Distr.

Harry U. Fuller Chief Engineer Portland Water Distr.

(Photo by courtesy of Portland Press-Herald)

Manager Reny and His P.W.D. Staff.

From the left—Harry U. Fuller, Chief Engr.; Milton Thorne, Sup't.; L. R. Smith, Sup't. Westbrook Div.; Fred J. Reny, Treasurer and Gen'l. Manager; Frank O. Boothby, Ass't. Superintendent.

The Second Day

On the second day the forenoon was devoted to group trips to points of interest on the P.W.D. system, learning "how P.W.D. does it" in shop and field, and inspection of exhibits.

A noon-day dinner featuring Maine's famed lobsters was attended by a record number—155 members and guests representing 75 water utilities throughout Maine.

The muchly coveted free-dinner "to that member travelling the greatest distance to the meeting" was won by Bert McIntyre of Holton, Me., for 32 years Engineer-Manager of Holton's water works and now a practicing engineer.

Technical Sessions

(D. A. Moulton, Presiding)

D. A. Moulton, Counsellor, Portland Water District, who has served as president of the Association ever since organization, presided at the noon-dinner and afternoon sessions.

The first paper was presented by F. J. Reny, General Manager of P.W.D., the nature of which does not lend itself well to a report of general interest, since, as he explained it, the document was prepared largely for the records. It constituted—

"A Recapitulation of All Work Done and Improvements Effected Under Governmental Agencies"

The Federal aid projects of the District which began in 1933 under C.W.A. were numerous and varied —the more recent ones since 1936 under P.W.A. and W.P.A. representing projects of magnitude, such as 48" main supply line, costing better than half a million, a Recreation Park and Playgrounds at the lake, distribution main enlargements, a standpipe and new chlorinating station. In all, more than 3,000 people had been given work and the Government's contributions had totalled better than $820,000 during the 6 years.

1933 and '34 C W A and E R A	$ 91,827.37
1935 and '36 W P A	40,824.79
1936 P W A (45%)	35,066.41
1937 P W A (45)%)	105,913.23
1938 W P A	85 053.08
1939 W P A	127,441.66
1939 P W A (est.)	334,213.21
	$820,339.75

President Moulton added that along with the Federal Aid program refinancing had been possible at a saving of interest amounting to $9,000 per year by retiring 4% bonds with funds derived from new bonds bearing but 2½% interest, made possible because of the very excellent financial condition of the District and essentially a guaranteed continuing income.

Horace L. Clark, Sup't.
Sanford (Me.) Water Co.

Edwin T. McDowell, Sup't.
Biddeford and Saco Water Co.

Charles M. Hobbs, Sup't.
Farmington Water Dept.

"Temperature Deficiencies and Frost Penetration" by HARRY U. FULLER, Chief Engineer, constituted a progress report covering studies of cumulative air temperature deficiencies and rate of frost movement from the surface downwards in two types of soils—gravel and sand vs. clay soils. Mr. Fuller has for the past several years been making such studies hopeful of arriving at a formula with which records of cumulative air temperature deficiency might be converted to depth to which frost has penetrated, thus giving advance warnings of where and when frozen mains or service lines might be expected, publication of consumer warnings of impending freezes and to run to waste to preclude freezing up of service lines and small mains.

The Portland study involves ground thermometer readings at sub surface depths, in increments of 6 inches, in gravel filled and clay filled pits, and air temperatures converted to a cumulative temperature deficiency curve. Mr. Fuller exhibited and explained the graphical records for the past year or more, from which derivation of a prediction formula involved too many variables to render any single formula practical. During the past year penetration in clay had been only 6 inches less than in the more open gravel—3½ and 4 ft. respectively. However, penetration in clay had been at a much slower rate, likewise leaving at a slower rate when air temperatures returned to above freezing.

Horace J. Cook, Sup't. Water and Sewer District, Auburn, Me., reported that he had followed Mr. Fuller's lead in watching frost depth penetration and air temperatures to good advantage, in anticipating troubles and taking prevention steps in time to avoid epidemic freeze-ups and much disagreeable thawing work. Apparently when air temperature permits ground thaw the frost line immediately starts upward to meet the down travelling thaw. Seemingly rising earth B.T.U.'s was responsible for such observations.

"Jimmy" Caird, Consulting Chemist, Troy, N. Y.; "Reggie" Hayes, Hydrotite Co., Boston; "Bill" McGarry, Neptune Meter Co., Boston.

Typhoid Death Rate in Maine

Jas. M. Caird, Consulting Chemist, Troy, N. Y., drew members' attention to the questionable water quality in many summer resorts and camps of Maine. He cited analysis made of 86 camp supply samples at the request of customers of the Portland Water District. Only 33% of the 86 were found safe and 59% proved definitely bad. He advocated that a warning should be issued to consumers by each water utility to look closely into the water supply of camps in order to keep down the Maine Typhoid Rate to that of communities served a safe water supply.

(1) *R. E. Sweeney, Distr. Mgr., U. S. Pipe and Fdry. Co., Boston;* (2) *J. H. Woodward, Sup't., Fryeburg (Me.) Water Co.;* (3) *H. L. Weston, Red-Head Mfg. Co., Boston;* (4) *A. F. McAlary, Sup't., Camden & Rockland (Me.) Water Co.;* (5) *Dan. J. Atwell, New England Representative, Pittsburgh Meter Co.;* (6) *T. E. Stimpson, Ass't. Sup't., Brunswick and Topsham, Water Distr.*

(1) W. C. Winn, Water Board Manager and Chairman, and H. L. Jones, Board Member, Town of Lisbon, Me.; (2) From Gardiner, Me., Sup't. Sam Soule brought this antique—a steam thawing machine of 1892; *(3) "President Dave" Moulton and R. M. Simon, New England Manager for R. D. Wood & Co. of Philadelphia.*

Antiques

A novel feature of the meeting were a few antiques in the nature of water works equipment brought in by members to exhibit.

Oldest Meters

In keeping with the idea was the exhibit of antique water meters at the booth of National Meter Company who this year are celebrating their 70th Anniversary as a pioneering manufacturer of water meters. The oldest meter exhibited was a Gem Meter No. 320 dated 1874—a queer looking outfit. One of granddaddies of the Empire line (1890) was also exhibited and members of ensuing generations up to 1940's Empire No. 2,513,119, still in its swaddling clothes. Several other antique members of the National family were also on parade, including the first meter featuring the enclosed intermediate gear train.

Thawing Machine of the Gay Nineties

From Gardiner, Me., Sup't. Sam Soule brought along an interesting old thawing machine (vintage 1892) of the kerosene burning steam generating type, with small hose line wound on a bronze reel (see cut). Mr. Soule reported that the apparatus was recently tested and found thoroughly serviceable.

Sanford History

From Sanford, Me., Sup't. Horace Clark brought some of the original bored log pipes (1878) showing how they were connected (8 to 10 ft. lengths 4" bore) with cast iron sleeves. One of the original fire hydrants proved a curiosity with its bronze valve of compression type and having a ground seat. Mr. Clark reported this hydrant in use up to a few years ago without leaking. He also read parts of the charter granted the original Sanford Water Works Co., which was required "to supply water of a purity equal to the Kennebec River water."

Portland's Hydrant Chuck—1870

The original water company had no hydrant problems apparently, because every fire engine or hose truck carried with it its own hydrant barrel, known as a hydrant-chuck, for screwing onto the riser pipe located in pits in the sidewalks. The idea

"Pat" Kelly, New England Mgr. for The Leadite Co.; Arthur Burke, E. & F. King & Co., Augusta, Me.; Jack Carey, Mathieson Alkali Wks., Providence, R. I.

apparently was that stationary sidewalk hydrants were subject to freezing and an obstruction. It couldn't have been a matter of prevention of damage by trucks or automobiles in 1870. The 70 year old Lowery Hydrant Chuck exhibited by the Portland Water District, and pictured in this report, was in use for 65 years, becoming a museum piece only in 1935.

The surprising thing was that Portland did not exhibit some of its very early iron pipe coated and lined with natural cement, some of which it is understood was in service until very recently.

Meters of "Yesterday and Today".
In keeping with the order of the day National Meter Co.'s exhibit featured "70 Years of National Meters." The oldest was a "Gem" of 1874 *(No.* 370*); the newest an "Empire" of* 1940 *(No.* 2,513,119*). The first meter to boast an enclosed intermediate—the "Crown" of* 1879*—was also exhibited.*

Schedule of Future Meetings

The following schedule of future meetings of the Association was announced by Editor S. S. Anthony:

Apr.	10th	Augusta
*June	12th	Poland Spring
Aug.	14th	Boothbay Harbor
Oct.	9th	Millinocket
Dec.	12th	Mexico

* The June meeting at Poland Spring is to be a special joint meeting with the recently organized New Hampshire Water Works Association.

After voting a $100 contribution to the National Committee, organized to fight Federal taxation of municipal bonds, the meeting was declared adjourned.

CHLORINATED RIVER WATER FOR STREET FLUSHING

(Just as Wet as New York's Drinking Water and There's More of It)

New York City, facing a water shortage, has been campaigning for curtailment of water use and stoppage of waste.

In keeping with the conservation campaign, and practicing what is preached, the City is itself following a program of water supply conservation. To-wit: The Department of Sanitation has turned from fire-hydrants to the Hudson and East Rivers as the source of water for its fleet of mobile street flushers. Tank wagons and flushers are being filled with water pumped from the Hudson River and other water bodies surrounding the island. To render the sewage polluted water safe for street flushing it is heavily chlorinated.

Portable gasoline engine driven pump units have been installed for the purpose at 40 points along the waterfront, to save roughly 5,000,000 gallons per day of the City's rapidly dwindling water supply. The chlorination is rather simply provided by adding a strong solution of one of the high-test hypochlorites to the tank during fiilling. Sufficient is added to insure residual chlorine to the extent of 20 p.p.m. or better in the sprinkler water and New York is getting disinfected and deodorized (some parts need it) while conserving the precious liquid up in Ashokan and Croton.

"MODERN PIONEERS"

The Signal Honor Bestowed on Chas. F. Wallace—J. V. N. Dorr by American Industry

AMONGST the nineteen men singled out for recognition as the Nation's "Modern Pioneers" in scientific achievement and invention, the water works and sewerage industry can well be proud of the fact that two of these nineteen honored pioneers in American industry were cited for achievements in advancing the art of water purification and sewage treatment. These two men were Charles Frederick Wallace, of Wallace and Tiernan Company, and John Van Nostrand Dorr, of The Dorr Company.

Amongst those to receive recognition in the form of a Regional Award was an associate of Mr. Wallace—Dr. John C. Baker, of Wallace and Tiernan Co.

These so-called "Modern Pioneer" Awards were appropriately made on the 150th Anniversary of the founding of the U. S. Patent System at a dinner on February 29th in New York City given in honor of these leaders in American invention and industry. This occasion taxed the capacity of the Grand Ball Room (and all balconies) in the Waldorf-Astoria Hotel.

Those singled out for the honor were chosen by a committee of scientists, headed by Dr. Karl T. Compton, President of the Mass. Institute of Technology, to make the selections for the National Association of Manufacturers. For the honor very nearly 1,000 scientists and inventors were nominated from American industry but only the nineteen were chosen as those truly deserving of

J. V. N. Dorr

the title "Modern Pioneer," which carried with it the presentation of a handsome and costly symbolic plaque of solid silver bearing the citation. The ceremony was highly impressive and the importance of the occasion can be measured by the fact that a full hour of radio time was accorded it on a National hook-up.

Amongst those honored along with "our heroes" from the field of sanitation, Fred Wallace and John Dorr, were such names as Henry Ford, General Motors' Kettering, Orville Wright, General Electric's Langmuir and Coolidge, Bakelite's Bakeland, Armco's Tytus, Columbia's Armstrong, Standard Oil's Burton, Cottrell, Carrier and DeForest. The youngest inventor honored was 30 year old Edwin Land, the inventor and producer of "Polaroid" glass. For the invention of DuPont's "NYLON" the award went to a group rather than an individual.

Citations

The following have been taken from the citations of Messrs. Dorr and Wallace:

To: *John VanNostrand Dorr*—"A chemical engineer and metallurgist, by whose inventions metallurgical and industrial chemical processes have been improved in every civilized country; the waters of many large cities purified and made wholesome, and sewage effluents rendered harmless."

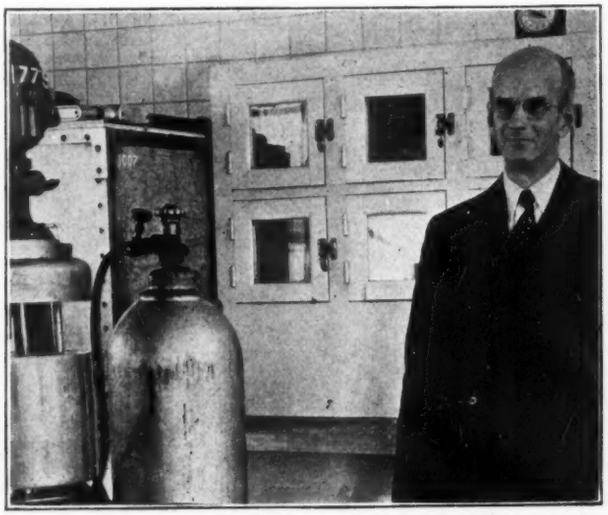
To: *Charles Frederick Wallace*—"By his inventions of numerous devices for accurately measuring and controlling the flow of gases and liquids. And, particularly, by making possible the application of chlorine in the treatment of waters and disposal of sewages, he has added greatly to the promotion of public health, and has solved some of the vital problems in sanitation in many lands."

Dr. John C. Baker was cited for inventing the "Agene" process of flour bleaching with nitrogen-trichloride and his other work with chlorine gas.

Other Regional Awards

Others connected with the water supply and sewerage field to receive Regional Awards, were the following: Max Spillman (Worthington Pump), Ralph E. Hall (Hall Laboratories), H. O. Halvorson (Univ. of Minnesota), E. L. Oliver (Oliver Filters), E. W. Bachrach (E. W. Bachrach & Co.), Wm. S. Wilson (Monsanto Chemical Co.), John F. White (Monsanto Chemical Co.), W. D. Moore, (Amer. Cast Iron Pipe Co.).

Mr. Wallace in His Laboratory



Dr. John Baker in His Laboratory

Ewing Galloway

The Winter Season

- Ice and snow and low water temperatures may bring any number of difficulties to the proper operation of a water treatment plant.
- Low water temperatures in themselves may give difficulty in coagultion results due to the greater density of the cold water. Filtration results may also be affected, necessitating changes in operating procedures.
- Algae growths in reservoirs during cold periods are considerably less frequent, but when they do occur are very difficult to treat, particularly if the reservoir is frozen over.
- The drought conditions, which have prevailed fairly uniformly throughout the country within the past few months, have resulted in low levels in reservoirs and streams which are the supply for a large number of water plants. Freezing weather has retarded usual run-offs of water so that low water levels have not been improved.
- Consequently, the water plant officials are faced with a combination of circumstances beyond their control so that they must be continuously vigilant to insure delivery of a pure, safe and palatable water at all times.
- AQUA NUCHAR Activated Crbon plays its part in assisting the water works officials in meeting stringent requirements of their consumers. AQUA NUCHAR is working very effectively in well over 1,000 water plants throughout the country by eliminating tastes and odors from water supplies even though the water temperatures are exceptionally low.

INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP AND PAPER COMPANY

NEW YORK CITY	CHICAGO	PHILADELPHIA	CLEVELAND
230 Park Avenue	35 E. Wacker Drive	1322 Widener Bldg.	417 Schofield Bldg.

NUCHAR — INSURES PALATABLE DRINKING WATER

➡ AQUA NUCHAR

American Water Works Association, 60th Annual Convention, Kansas City, Mo., April 21-25, 1940

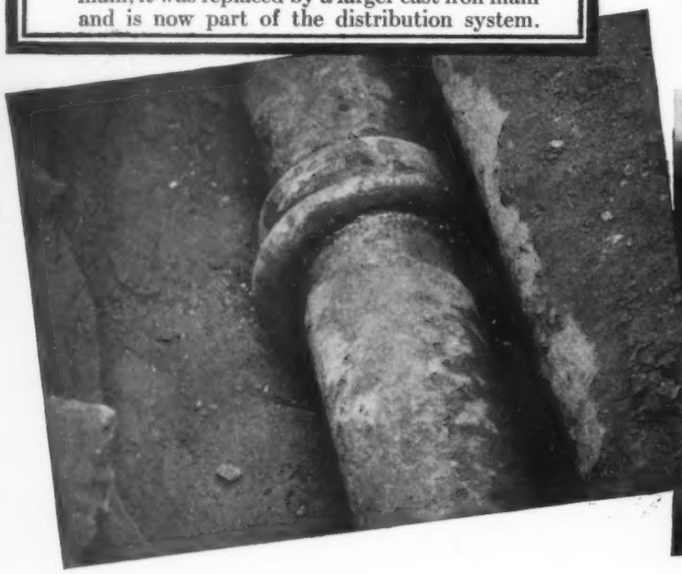
LINCOLN

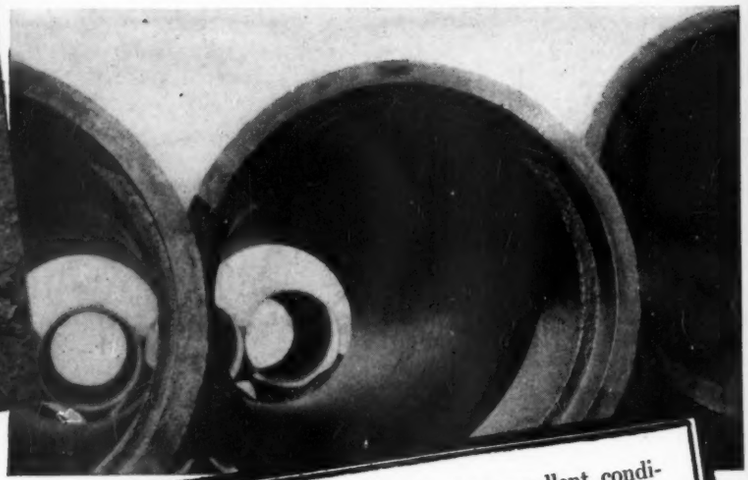
LOW MAINTENANCE

is an economy feature of cast iron pipe that is proved by water works records the nation over. An impartial survey among 195 water works superintendents shows that the maintenance cost of cast iron pipe is far below that of any other pipe material which has been in use long enough for the recording of conclusive data.

LONG LIFE

Unretouched photograph of America's second oldest cast iron water main still in service after 111 years in the water supply system of Lynchburg, Virginia. Originally a pumping main, it was replaced by a larger cast iron main and is now part of the distribution system.





SALVAGE VALUE Note excellent condition of this cast iron pipe, which was removed and cleaned for re-sale after a quarter-century of trouble-free service in the water distribution system of Dallas, Texas. Another instance of the salvage value of cast iron pipe.

Water mains represent about one-third of this country's 5-billion-dollar investment in public water supply systems. More than 98% of these mains are cast iron pipe with a *known* useful life at least double the *estimated* life of other water main materials. Because the tax-saving, through avoiding replacements, is enormous, cast iron pipe is known as Public Tax Saver No. 1.

CAST Q IRON

Look for the "Q-Check" Registered trade mark. Cast iron pipe is made in diameters from 1¼ to 84 inches

N IS ONE OF THE 96%

Original Cast Iron Pipe in service is indicated by solid symbols. Age of pipe is shown at left of symbol.

SYMBOLS: ★ *In service 100 years or more* ■ *50 to 99 years* ● *under 50 years*

ALABAMA
67 □ Birmingham
89 ■ Mobile
57 ■ Tuscaloosa

ARKANSAS
56 ■ Fort Smith
54 ■ Little Rock

CALIFORNIA
31 ● Alhambra
52 ■ Fresno
42 ● Long Beach
63 ■ Oakland
53 ■ Pasadena
54 ■ San Diego
73 ■ Los Angeles
87 ■ Sacramento
81 ■ San Francisco
81 ■ Stockton

COLORADO
69 ■ Denver
40 ● Fort Collins
66 ■ Pueblo

CONNECTICUT
86 ■ Hartford
87 ■ New London
61 ■ Stamford

DELAWARE
92 □ Wilmington

DISTRICT OF COLUMBIA
81 ■ Washington

FLORIDA
61 ■ Jacksonville
53 ■ Orlando
48 ● St. Augustine
46 ● West Palm Beach

GEORGIA
86 ■ Atlanta
62 ■ Augusta
31 ● Decatur
88 ■ Macon

IDAHO
12 ● Boise
49 ● Pocatello

ILLINOIS
40 ● Berwyn
65 ■ Bloomington
88 ■ Chicago
54 ■ Elgin
66 ■ Evanston
58 ■ Galesburg
86 ■ Moline
60 ■ Oak Park
71 ■ Peoria
68 ■ Quincy
64 ■ Rockford

INDIANA
56 ■ Elkhart
68 ■ Evansville
59 ■ Fort Wayne
33 ● Gary
87 ■ Indianapolis
65 ■ La Fayette
53 ■ Michigan City
55 ■ Richmond
67 ■ Terre Haute

IOWA
61 ■ Burlington
67 ■ Davenport
69 ■ Des Moines
70 ■ Dubuque
60 ■ Ottumwa

KANSAS
53 ■ Hutchinson
59 ■ Topeka

KENTUCKY
71 ■ Covington
80 ■ Louisville
55 ■ Paducah

LOUISIANA
36 ● New Orleans
53 ■ Shreveport

MAINE
65 ■ Bangor
71 ■ Portland

MARYLAND
106 ★ Baltimore
59 ■ Hagerstown

MASSACHUSETTS
93 ■ Boston
63 □ Brockton
73 ■ Cambridge
73 ■ Chelsea
68 □ Fall River
64 ■ Fitchburg
67 ■ Holyoke
69 ■ Lowell
52 ■ Malden
71 ■ New Bedford
65 ■ Newton
35 ● Revere
55 □ Somerville
66 ■ Springfield
64 ■ Taunton
67 ■ Waltham
68 ■ Worcester

MICHIGAN
55 ■ Ann Arbor
53 ■ Battle Creek
68 ■ Bay City
26 ● Dearborn
101 ★ Detroit
57 ■ Flint
67 ■ Grand Rapids
52 ■ Hamtramck
44 ● Highland Park
68 □ Kalamazoo
69 ■ Muskegon
68 ■ Port Huron

MINNESOTA
57 ■ Duluth
65 ■ Minneapolis
63 ■ St. Paul

MISSISSIPPI
52 ■ Jackson
54 ■ Vicksburg

MISSOURI
110 ★ St. Louis
66 ■ Kansas City
57 ■ Springfield

MONTANA
41 ● Billings
51 ■ Great Falls
17 ● Missoula

NEBRASKA
56 ■ Lincoln
71 ■ Omaha

NEW HAMPSHIRE
50 ■ Berlin
90 ■ Concord
88 ■ Manchester
86 ■ Nashua

NEW JERSEY
58 ■ Atlantic City
52 ■ Elizabeth
67 ■ Hoboken (Hackensack Water Co.)
78 ■ Jersey City
92 ■ Newark
63 ■ New Brunswick
84 ■ Paterson
49 ● Plainfield

NEW YORK
53 ■ Amsterdam
65 ■ Binghamton
78 ■ Elmira
57 ■ Jamestown
57 ■ Kingston
54 ■ Mt. Vernon
54 ■ New Rochelle
109 ☆ New York City
48 ● Niagara Falls
66 ■ Rochester
88 ■ Syracuse
91 ■ Utica
64 ■ Yonkers

NEW MEXICO
32 ● Roswell

NORTH CAROLINA
54 ■ Asheville
58 ■ Charlotte
54 ■ Durham
52 ■ Greensboro
39 ● High Point
53 ■ Raleigh
59 ■ Wilmington

NORTH DAKOTA
54 ■ Bismark
55 ■ Fargo
57 ■ Grand Forks

OHIO
59 ■ Akron
64 ■ Cincinnati
84 ■ Cleveland
45 ● Cleveland Hts.
70 ■ Columbus
40 ● East Cleveland
56 ■ Hamilton
58 ■ Lima
50 ■ Marian
55 ■ Newark
68 ■ Toledo
53 ■ Warren
68 ■ Youngstown

OKLAHOMA
37 ● Ada
39 ● Enid
40 ● Oklahoma City

OREGON
33 ● Eugene
74 ■ Portland

PENNSYLVANIA
72 ■ Erie
73 ■ Johnstown
105 ★ Lancaster
59 ■ New Castle
118 ★ Philadelphia
91 □ Pittsburgh
106 ★ Reading
51 ■ Wilkinsburg
100 ★ York

RHODE ISLAND
63 ■ Pawtucket
86 ■ Providence
57 ■ Woonsocket

SOUTH CAROLINA
102 ★ Charleston
52 ■ Greenville
58 ■ Spartanburg

TENNESSEE
76 ■ Chattanooga
55 ■ Knoxville
108 ★ Nashville

TEXAS
65 ■ Dallas
54 ■ Fort Worth
49 ● San Angelo
53 ■ Texarkana

UTAH
56 ■ Provo
60 ■ Salt Lake City

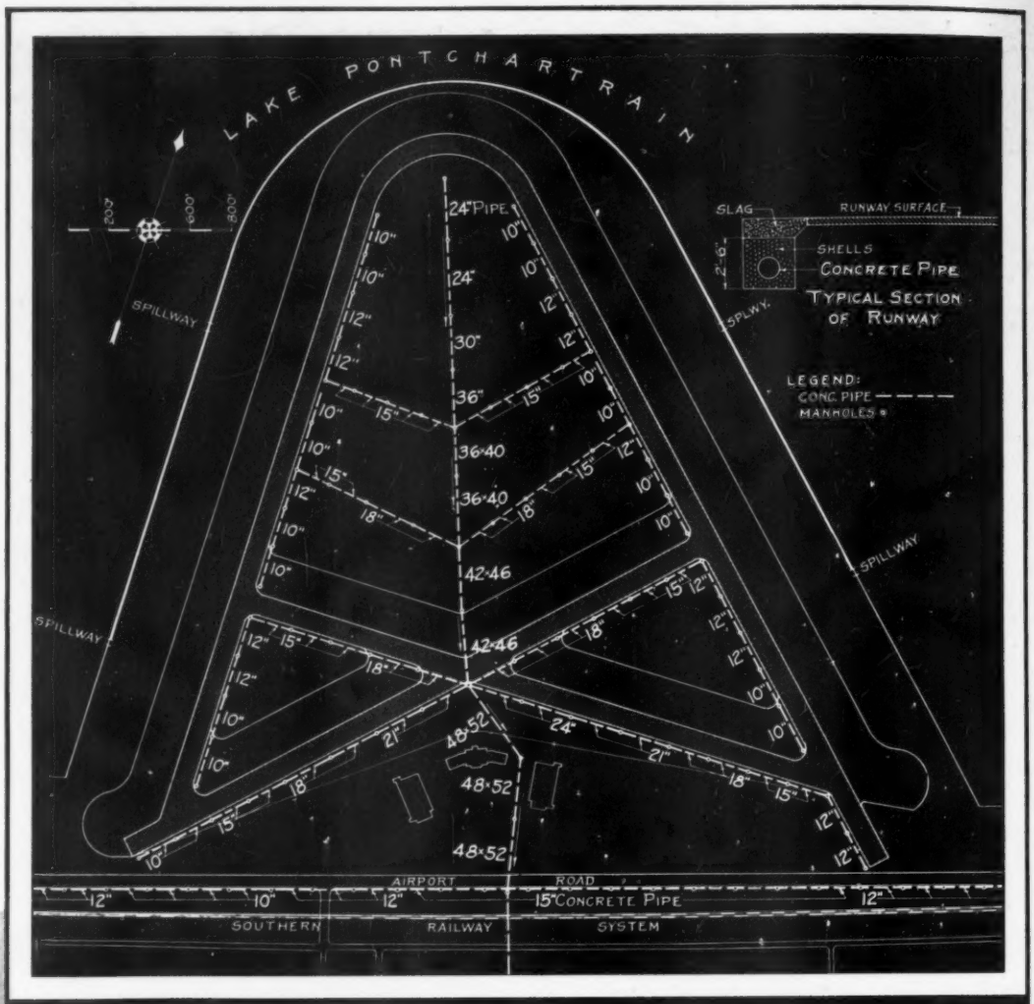
VIRGINIA
111 ★ Lynchburg
51 ■ Newport News
69 ■ Norfolk
84 ■ Petersburg
52 ■ Portsmouth
109 ★ Richmond

WASHINGTON
50 ■ Bellingham
54 ■ Seattle
53 ■ Tacoma

WEST VIRGINIA
52 ■ Clarksburg
106 ★ Wheeling

WISCONSIN
55 ■ Eau Claire
55 ■ Fond DuLac
54 ■ Green Bay
46 ● Kenosha
60 ■ Madison
68 ■ Milwaukee
58 ■ Oshkosh
54 ■ Racine
51 ■ Sheboygan
51 ■ Superior
35 ● West Allis

NOTE: In a few instances gas mains are referred to where they are older than water mains.



New Orleans Airport. More than 25,000 ft. of concrete sewer and reinforced concrete sewer pipe was used in the drainage system shown. Pipe lines, ranging in diameter from 10-in. to 48-in., are built on adequate grades to provide self-cleansing velocities, and are adequate in capacity to insure quick run-off. Entire system in excellent structural condition today.

(Below) *Buffalo, N. Y., Municipal Airport.* Constructing a 36-in. reinforced concrete pipe intercepting drain.

For Airport Drainage Jobs... *play safe with* CONCRETE PIPE

Modern airports must be properly drained. The ideal procedure is to design and build the complete drainage system as an integral part of the airport development—as was done at New Orleans Airport.

And, as at New Orleans, the preferred drainage construction is *concrete pipe throughout. Concrete fully meets ALL the requirements of low first cost, structural safety, durability and maximum hydraulic capacity.*

Concrete pipe has been used to drain many of the country's leading airports. Write for literature on use of concrete pipe and reinforced concrete for your drainage or sewerage problem.

PORTLAND CEMENT ASSOCIATION, Dept. 3-29, 33 W. Grand Ave., Chicago, Ill.

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

AN ALL-TIME RECORD FOR A N.E.W.W.A. MEETING

Only It's on the Low Side

THIS report will catalog two records. It will be a report of record brevity of a meeting of record brevity, and low attendance.

The February Meeting of the New England Water Works Association turned out to be the most sparsely attended of any meeting of this Association since its founding in 1880—establishing a 60 year all-time low. There was a reason—and a real one. We might add that it had to be a real one to keep N.E.W.W.A. members away.

What Kept New Englanders at Home.
Just a glimpse through the window from what was to have been the meeting room in Hotel Statler.

A New England Nor'easter blizzard that *was* a BLIZZARD had raged all the night before to about as completely paralyze Boston and the eastern section of the State, as even the old-timers could recall. Negotiating U. S. Highway No. 1 between Portland, Maine and Boston (the outskirts, one should say, for we never did get in by car) during this howling, blinding, unrelenting, holocaust constituted an epic experience not soon to be forgotten. Getting from our final stranding spot into the hotel was another experience, and securing hotel accomodations (reservations meaning little with lobbies filled with stranded Bostonians clamoring for sleeping quarters) was still another. At this point we wish to pay our respects to Reggie Hayes—blizzard driver extraordinary — who brought us through and was rewarded with a cot and a blanket, after two hours of effort to get such, but had to use our shower curtain for a sheet, while many another had nothing but the blanket and the softest spot to be found on Hotel Statler floors. It was a night which Bostonians will not soon forget—nor those let off of trains 6 to 8 hours late on the outskirts, because they couldn't get into the central stations, and had to hoof it several miles through trolley subways to reach hotels. Taxis?—such were just about as useless that night as a camel in mid-ocean.

For a time it looked like the February 15th meeting would consist of President Shaw, Theo. L. Bristol

The President
Percy A. Shaw, Sup't., Manchester, N. H.
(Snapped on a balmier day.)

(one of the most consistent attenders) two reporters and three peddlers. However, as the few hopefuls waited and peered out of Hotel Statler windows at paralyzed automobiles completely snow covered, over the tops of which men were proceeding on skiis or snow shoes; and, watching men cutting passage-ways through 7 to 10 ft. high drifts right in the heart of the Hub City, one after another member arrived to explain how he finally got through. By the luncheon hour the usual influx of Bostonians had swelled the total number to 38 souls and it was decided that the single available scheduled speaker for the afternoon program would present his paper.

Sam. M. Ellsworth, Consulting Engineer, Boston. (Program Committee Chairman.)

Theo. L. Bristol President, Ansonia Water Co., Ansonia, Conn. (Possibly N.E.W.W.A.'s Most Consistent Attendant.)

Gifford's First Miss in 25 Years

Secretary Frank Gifford didn't get closer to the meeting than the other end of a telephone wire in Dedham, explaining that it was the first regular meeting of N.E.W.W.A. that he had missed in 25 years. So Percy Shaw became, in addition to President, Secretary, luncheon ticket seller, registrar, etc. However, he didn't have to be Ass't. Sec'y. also because Marcella Sachs somehow got in.

And the Program

Appropriate enough were the topics scheduled for the Round Tables of the "Supers" and the Chemists—"Winter Troubles in Operation and Maintenance" and "Winter Algae Troubles." Amongst late arrivals were Round Table Leaders Louis Davis, Sup't. of Water, Merrimac, Mass., and Clarence Sterling, Mass. Dep't. of Health, Westfield, Mass., who admitted that there were "Winter Troubles," but preferred not to say much about them, except to comment that those that were scheduled to "lead" in the discussion must be wishing that they could be telling about their "Winter Troubles" and not be so darned "close to their subject."

The Luncheon Session

Presiding	Pres. P. A. Shaw
Registrar	Ditto
Ticket Seller..	Ditto

"Our Hero" explained that he deserved no especial credit for being on hand because he had left his sunny home in Manchester, N. H., only to run into this mess and he only hoped that before Sunday he would be able to locate and dig out his car abandoned somewhere on the streets of

STORM PARALYZES STATE

13 Dead, Trains, El, Buses, Autos Halted Thousands Marooned in City and Suburbs Department Stores, Schools Are Closed

New England's Largest Evening Circulation

WALL ST-STATE ST-FINAL

Boston Traveler

Complete Associated Press and United Press Wire Services

THE WEATHER—U. S. Official Forecast
FAIR, COLD TONIGHT AND FRIDAY
Moon sets Friday 12:38 A. M.
High tide 3:39 A. M., 4:06 P. M.
Sunrise 6:52, sunset 5:13
LIGHT VEHICLES BY 5:45

ESTABLISHED 1825 — 115th YEAR — NO. 190 BOSTON, THURSDAY, FEBRUARY 15, 1940 TWENTY PAGES PRICE TWO CENTS

what the last he saw of it was unquestionably Boston.

The one paper read was that by Chas. W. Sherman, of Metcalf and Eddy, Boston—

"The Useful Life of Iron and Steel Standpipes"

Mr. Sherman's paper consisted mainly of many tabulated pages of statistical data on the life history of steel and iron standpipes in New England and New York State. The data had been secured through questionnaire sent to all municipalities in the region known to have had standpipes in 1897 or earlier.

The useful life of the standpipes covered in the 111 replies to the questions asked follows:

State	No.	Avg. Life	Max. Life
Maine	26	44 yrs.	53 yrs.
Mass.	52	43 "	58 "
R. I.	—	24 "	46 "
N. H.	7	47 "	47 "
Conn.	5	—	46 "
New York	12	38 "	49+ "

On the basis of the history of the 111 standpipes in service for 35 years or longer, the reasonable average life expectancy seemed to be 45 years. Sixty-seven of these standpipes showed an average of 47 years of useful life. On the basis of this study the former allowance of a 35 yr. life expectancy would have to be revised upwards, by 10 years, to 45 years and it seemed reasonable to believe that 50 years or longer should be a safe predicted useful life, considering improved materials and methods of maintaining steel standpipes.

The Use of Reservoirs as Hydroplane Landing Places

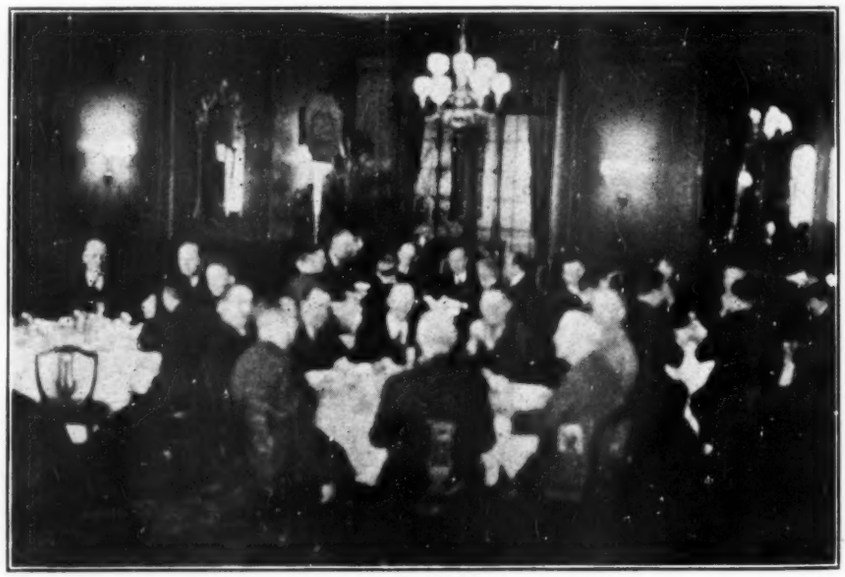
The unscheduled question of permissive use of water supply reservoirs as landing places for hydroplanes was commented on by Chief Engineer Arthur D. Weston of the Mass. Dep't. of Health.

Mr. Weston announced that this question had been brought to the Department by the Mass. Aeronautical Commission. In reply, the policy of the Department would be the same as now existed in respect to boating and fishing on potable supply reservoirs:

(1) The local Board of Water Commissioners must decide whether or not to permit such use.

(2) The Rules and Regulations of the Dept. of Health prohibit such, along with other comparable uses, unless the local Board approves and supervises such recreational use. The Department would advise caution in granting such permits in as much as hydroplanes, like sea-gulls, were not particular where they landed in polluted coastal waters before taking off for a nearby reservoir landing. In some instances the danger might be remote, in others not so. The Department would be glad to consider each case on its own merits and advise local authorities accordingly.

President Shaw commented that in New Hampshire there was a growing demand for recreational uses of wa-



Believe it; or Not!

The luncheon session of a 1940 N.E.W.W.A. meeting—establishing a record low attendance since 1880, when organized. Even Secretary Gifford, with a no-miss record of 25 years, missed this one.

Blizzard-Men From Amongst the Ambassadors of Commerce.

(1) "Don" K. Otis (A. P. Smith Mfg. Co.); (2) "Jo" G. Lufkin (National Meter Co.); (3) "Ed." H. Thwaits (Youngstown Sheet and Tube Co.); (4) J. Herman Smith (Hersey Meter & Mfg. Co.); (5) "Bill" Niesley (former Ass't. Secy. A.W.W.A., now with Fred W. Hanks Co. of Cleveland); (6) "Matt" Allen (Builders Iron Foundry); (7) Frank Brainard, (Pres. Frank S. Brainard Co. and Division Engr., Water Bureaus of Hartford, Conn.); (8) "Bill" Johnson (Phoenix Meter Co.); (9) "Ed" M. Battey (until recently Chemist, Providence, R. I., Filter Plant, is now Sales Engineer for International Filter Co.)

ter supply reservoirs, and recently pressure in this direction had been coming from the State Dep't. of Conservation and Development. In Manchester requests had been made for permits to allow hydroplanes to operate on the reservoirs, as land planes do on land, in taking passengers for short rides at a charge. So far permits had been refused but the pressure was increasing for more general recreational use of water supply areas.

N.E.W.W.A.'s Blizzard-Men of 1940

It is not usual that we print registration lists. However, the hardy men of February 15, 1940, deserve a place in the records. The registration list, totalling 38, may be broken down into a total of only 13 active members and 1 guest from outside of the city of Boston and 5 members from Boston. It is interesting that the numbers attending were equally divided between members and "Ambassadors of Commerce":

Members and Guests—19

Anthony, S. S., Supt.
Augusta Water District
Augusta, Maine
Barry, Wm. T., Supt.
Holyoke Water Works
Holyoke, Mass.
Bristol, Theodore L., Pres.
The Ansonia Water Co.
Ansonia, Conn.
Brainard, F. S., Engr.
Water Bureau
Hartford, Conn.
Davis, L. B., Supt.
Water Dep't.
Merrimac, Mass.
Enslow, L. H., Editor
"Water Works and Sewerage"
New York City
Ellsworth, S. M., Cons. Engr.
Boston, Mass.
Hedge. Edward J.
(Guest)
Worcester, Mass.
Holmgren, R. S., Chief Engr.
Water Resources Board
Concord, N. H.
Libby, Maurice, Supt.
Bath Water District
Bath, Maine
Lourie, G. E., Supt.
Bristol Water Dept.
Bristol, Conn.
Lucey, P. J., Engr.
Holyoke Water Dept.
Holyoke, Mass.
Shaw, Arthur L.
Metcalf & Eddy
Boston, Mass.
Shaw, Percy A., Supt.
Water Dept.
Manchester, N. H.
Sherman, Chas. W., Cons. Engr.
Boston, Mass.
Sterling, Clarence I., Engr.
Mass. Dept. of Health
Westfield, Mass.
Wellington, M. S., Chemist
New Haven Water Co.
West Haven, Conn.
Weston, A. D., Chief Engr.
Mass. Dept. of Health
Boston, Mass.
Wright, Edward, Engr.
Mass. Dept. of Health
Boston, Mass.

Mfgr's. Representatives—19

Askley, R. W.
(Company?)
Boston, Mass.
Allan, Matt
Builders Iron Foundry
Providence, R. I.
Powers, A. W.
Cohoes Rolling Mill Co.
Troy, N. Y.
Lynch, Charles L.
Farnan Brass Works Co.
Worcester, Mass.
Smith, J. Herman
Hersey Mfg. Co.
Boston, Mass.
Battey, Everett W.
International Filter Co.
New York City
Crosby, D. C.
Johns-Manville Corp.
Boston, Mass.
Lufkin, E. P.
National Meter Co.
Boston, Mass.
Lufkin, J. G.
National Meter Co.
Boston, Mass.
Morley, J. A.
Pittsburgh-Des Moines Steel Co.
New York City
Johnson, W. H.
Phoenix Meter Corp.
Prince Bay, S. I., N. Y.
Harder, George
Revere Copper and Brass, Inc.
Boston, Mass.
Otis, D. K.
A. P. Smith Mfg. Co.
East Orange, N. J.
Niesley, W. M.
Fred W. Hanks Co.
Boston, Mass.
Sweeney, R. E.
U. S. Pipe and Foundry Co.
Boston, Mass.
Pratt, Gilbert H.
Wallace & Tiernan Co.
Boston, Mass.

Louis B. Davis, Supt., Merrimac, Mass. (Chairman of Sup'ts. Round Table.)
George E. Lourie, Sup't., Bristol, Conn. (Wondered how he was to get back home.)
Clarence I. Sterling, Distr. Engr., Mass. Dept. of Health, Pittsfield, Mass. (Chairman of Chemists' Round Table.)

Craven, T. T.
Warren Pipe Co.
Boston, Mass.
Wolpert, N. N.
"Water Works Engineering"
New York City
Thwaits, E. H.
Youngstown Sheet and Tube Co.
Youngstown, Ohio

UNITED STATES LEADS WORLD IN DEVELOPED WATER POWER

According to data compiled by the U. S. Geological Survey the picture of *developed* water power in the 10 leading countries of the world is the following:

Country—	Horse Power
United States*	17,949,000
Canada	8,191,000
Italy	6,000,000
France	5,400,000
Japan	4,800,000
Germany	4,000,000
Norway	3,000,000
Switzerland	2,800,000
Sweden	2,200,000
Soviet Russia	1,630,000

(*Note:—In the U. S. A. the increase in *capacity* of water wheels installed has mounted from 23,000,000 hp. in 1920 to 64,000,000 hp. at the end of 1938—an increase of 180 per cent in 18 years. Someone may say: "Fine—but, what are we going to do with it all?"—Ed.)

KANSAS CITY CONVENTION PROMISES TO BE A HUMMER

Kansas City Auditorium

A.W.W.A. Releases Program; Social Security Administrator McNutt to Speak; Hotel Space Taken Exceeds All Expectations; Local Committee of Go-Getters to Answer Question "Why Kansas City?"

WITH the stage pretty much set for the 1940 Convention in Kansas City, A.W.W.A. releases the Technical Program.

Secured as the featured guest speaker, the live-wire Administrator of the Federal Security Agency—Governor Paul McNutt—has accepted an invitation to appear and speak on the Social Security Act and plans of the Federal Security Agency, in respect to effects upon and relationship to those connected with the operation of water supply and sewerage works in the United States. Having recently heard and seen the Administrator in action, we can guarantee that he will have something to say that is well worth listening to.

THE KANSAS CITY PROGRAM

(Subject to Possible Minor Changes)

GENERAL SESSIONS

Monday, April 22, 9:30 A.M.

Association Business Meeting.
Special Reports of Water Works Practice Committees.
Specifications for Pipe for Water Works Use (A Panel Discussion).

Malcolm Pirnie	L. R. Howson
Thos. H. Wiggin	Wm. W. Brush
W. W. Hurlbut	F. A. Barbour

Monday, April 22, 2 P.M.

A Program of Equipment Replacement—A. M. Brenneke. (Defeating Obsolescence.)
Discussion by G. S. Rawlins.
An Engineer's Viewpoint After Four Years' Experience in Public Life—F. O. Wallene.
Present Status of Cross Connection Control—E. S. Chase.
Drilling Wells and Installing Well Pumps—(A Round Table Discussion).

Tuesday, April 23, 9:30 A.M.

(Missouri Valley Section in Charge)

The New Pumping Station of Kansas City, Kan.—C. S. Timanus and R. L. Baldwin.
Wichita's Water Supply Improvements—R. E. Lawrence.
Pumping and Related Equipment—S. M. Dunn.
Novel Design Features of the Lansing (Mich.) Water Conditioning Plant—Claude Erickson.

Tuesday, April 23, 2 P.M.

Symposium on Steel Pipe

Construction and Tests of High Pressure Steel Water Supply Line for Colorado Springs—E. L. Mosley.
Behavior of Flexible Steel Pipe Under Trench and Fill Loads—Russell Barnard.
Utilization of Steel Pipe for Water Supply and Distribution Systems—H. R. Redington.
Types of Coatings Used for Protection of Interior and Exterior Surfaces of Steel Water Lines—Deming Bronson.
Service Life of Coal Tar Enamel Protective Coatings—Harry R. Hayes.

Tuesday Evening

The Social Security Act and the Water Supply Industry—Administrator Paul V. McNutt, Federal Security Agency.

Wednesday, April 24, 9:30 A.M.

General Session on Management

Organizing to Prevent Fires—Percy Bugbee.
The Engineer Looks at Management—R. E. McDonnell.
The Public Service Commission's Part in Water Plant Management—Robert Nixon.
The Water Board as a Factor in Good Management—Henry S. Nollen.
Discussion led by H. A. Van Norman, George Rohan.

Thursday, April 25, 9:30 A.M.

General Session on Water Purification

The Water Quality Requirements of the Soft Drink Industry—Kennon Mott.

Pioneer Mother in Penn Valley Park

The Safety Factor in Water Purification—Paul Hansen.
Dry Feed Chemical Equipment—L. E. Harper.
(What is wrong with present specifications?)
Some Aspects of the New Patent Law—A. C. Brown.
Discussion by D. L. Erickson.

Thursday, April 25, 2 P.M.
Plant Management and Operation

Cathodic Protection of Water Tanks—E. E. Norman.
Lining Cast-Iron Water Mains in Place with Cement Mortar at Charleston, S. C.—J. E. Gibson.
Studies on Corrosion—Pipe Materials and Linings—Paul Weir.
(From a Practical Operator's Point of View.)
Modern Hypochlorites—John Logan and Walter Savell.

FINANCE AND ACCOUNTING DIV.
Tuesday, April 23, 9:30 A.M.

A Review of Lien Laws in the United States—H. L. Meites.
A Customer's Service Bureau—Hal F. Smith.
The Texas Fire Insurance Department—Albert Davis.
Special Rates and Free Water Service (A Round Table) led by Dale Maffitt..

Thursday, April 25, 9:30 A.M.

Experiences With a Department Newspaper—George S. Bonn.
The Management of Combined Municipal Utilities—O. E. Eckert.
Efficiency in the Management of Water Works Properties—L. N. Thompson.
Legal Decisions Relating to Water Distribution—Frank A. Marston.

PURIFICATION DIVISON
Monday, April 22, 2 P.M.
Reports of Committees

Activated Carbon Research—M. M. Braidech.
Chloramination—F. W. Gilcreas.
Coordination of Methods of Water Treatment and Laboratory Control—Geo. D. Norcom.
Methods of Determining Fluorides—A. P. Black.
Discussion by W. R. Willis.
Standards for Purification Plant Operation—Edw. S. Hopkins.

Tuesday, April 23, 2 P.M.
Controlling Tastes and Odors

(Experiences with ammonia, activated carbon, copper sulfate and super-chlorination)
A Panel Discussion by

L. J. Alexander	N. A. Thomas
C. K. Calvert	A. E. Griffin
W. U. Gallaher	E. A. Sigworth

Summary of above by J. R. Baylis.

Wednesday, April 24, 9:30 A.M.
Water Quality Control

Corrosion Prevention by the Use of Sodium Hexametaphosphate—Edw. C. Trax and Robt. Spurr Weston.
The Physiological Effects of Sodium Hexametaphosphate—K. K. Jones, M.D.
Depreciation of Water Quality in Distribution Systems—Norman J. Howard.
Bacterial Quality—Norman J. Howard.
Chemical and Biological Quality—A. M. Buswell and Max Suter.

Entertainment

The Registration Desk exhibits will be open all day Sunday (Apr. 21st) in order to relieve the usual Monday morning registration congestion and to allow a greater opportunity for examination of the largest equipment exhibit ever to be staged at an A. W. W. A. Convention.

Sunday evening there is sheduled a "Get Together" to be held in the Little Theater of the Auditorium, where puppets in a marionette show will depict "A Day in the Life of a Water Superintendent." On Monday evening there will be the customary Reception and Dance, with an innovation consisting of an old-fashioned square dance led by a group of expert square dancers from Colorado Springs. Tuesday afternoon the ladies will visit Kansas City's famed Nelson Gallery of Art and see something of the residential and park sections of the city on a conducted sight-seeing tour.

McNutt Tuesday Evening

A feature of this year's "All Division Dinner" on Tuesday evening will be the appearance of the former Governor of Indiana and later High Commissioner of the Philippines—the Honorable Paul V. McNutt—who is now Federal Security Administrator. He will speak on the Security Program and its aspects of interest to municipal employees. Following this address (Tuesday night being the only time at which the Administrator could appear) there will be a floor show and dancing.

"Red Gulch" Wide Open!

On Wednesday evening—the "Red Gulch Jamboree."

Here roulette wheels will spin out the fortune of A. W. W. A. gamblers and dice will click while Blackjack may attract those inclined to the "pasteboards". Thousands of A. W. W. A. "gold certificates" will change hands; and, to the big "winnahs"—big prizes.

Thursday afternoon the ladies will lunch and play bridge at the Mission Hill Country Club, while the Golf Tournament is under way at the Hillcrest Club.

Thursday evening the closing Dinner and Dance, the crowning social event of the convention, is to be held in the Auditorium. Here the annual awards and honors will be conferred and dancing to K. C.'s finest orchestra follows.

Trip to K. C. Plants

On Wednesday afternoon there will be a trip out to the Filtration Plants and Pumping Stations of Kansas City, Mo., and Kansas City, Kansas, as the mid-week let-up in the technical meetings.

And if the straws in the wind are blowing true to form, the Kansas City Convention will further emphasize what Kansas City sold A. W. W. A. on—namely, that it's a darned good Convention City.

Wm. Rockhill Nelson Gallery of Art.

COMPLETE SEWAGE DISPOSAL FOR A SMALL COMMUNITY

A Plant of Unique Design Featuring Flexibility for Fluctuating Population

By MORRELL VROOMAN, JR.*
GLOVERSVILLE, NEW YORK

GUARDIAN of the recreational facilities of Lake George, in northern New York State, is the recently completed sewer system and treatment plant of Lake George Village. Special laws of New York State prevent any sewage, raw, or treated, from being discharged into the waters of Lake George or into any streams emptying into this picturesque and renowned body of water. Such made necessary the design of a disposal plant for complete treatment of the sewage of the village, with provisions also being made for absorption of the final effluent by the natural soil at the plant site.

The Village of Lake George nestles high in the mountain peaks of the Adirondacks at the head of Lake George, so named by Sir William Johnson in honor of his king, George II of England. This was in 1755 when the English troops defeated and drove back the French and Indians in a battle centering about hastily constructed defences called Fort George. First settlement of what is now Lake George Village was made in 1762 by an intrepid group of eleven families. Growth of the community was rapid, although retarded by the American Revolution during a period which made Lake George again the scene of bloody battles and Indian raids. The Village today is perhaps even better known for excellent recreational facilities and surroundings of great natural beauty than it is for its historic interest.

Population Ranges Three to One

Influx of summer visitors requires a treatment works approximately three times the capacity of a plant generally needed for a village of the normal population of Lake George. The population varies from approximately 1,500 in winter to about 5,000 at the height of the summer season. However, economical and efficient operation of the pumping equipment and the disposal plant is possible because of the plant design in three divisions to provide operations to meet load changes. In the winter season the lower capacity pumps and but roughly one-third of the disposal plant structures are used.

Consulting Engineer for the Village was Morrell Vrooman of Gloversville, N. Y., who designed and supervised the construction of the sewer system and sewage treatment plant. The pipe line work and some excavation at the plant was done as a WPA project. The construction of the disposal plant was done by men employed directly by the Village of Lake George under the supervision of a construction engineer furnished by the Consulting Engineer.

Essential to the Village, in making possible the construction of the sewerage system, was the work accomplished by the Works Progress Administration. By laying the pipe lines and doing part of the plant excavation with Federal funds, the Village saved about $100,000 on the costs of construction.

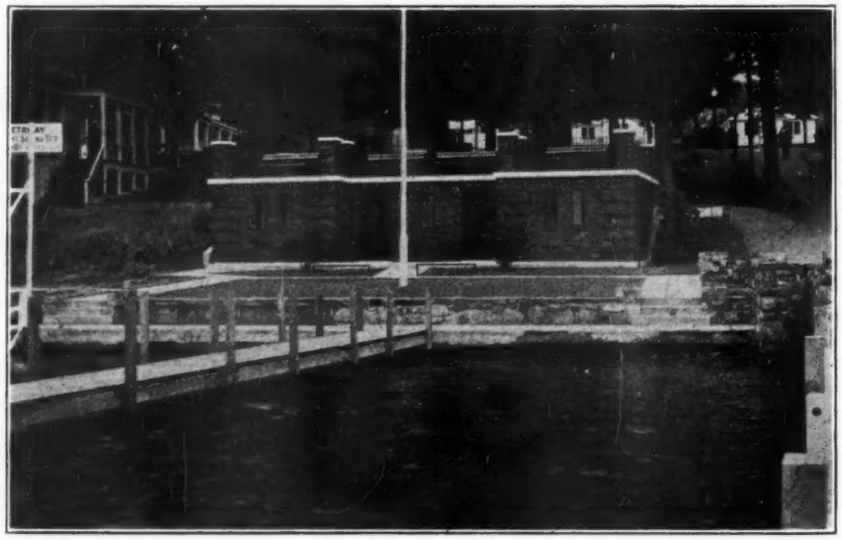
We "Encounter" Indians

Indians interferred twice with the laying of the sewer mains. However, our WPA workers "attacked them fiercely" with picks and shovels. Result—approximately a dozen skeletons of the Red-men of another day unearthed. They were identified as having been Lake George residents of about 170 years ago. The former tribesmen were carefully lifted out and unceremoniously reburied at another location, their dreams of raids on early settlers being only ruffled by the disturbance of modern improvement.

Installation of the sewer mains included approximately 10 miles of construction in streets and along the shore of the lake. The slope of the ground to the lake made necessary the collection of the sewage at a point on the lake shore proper. At this location was constructed the main collecting and pumping station.

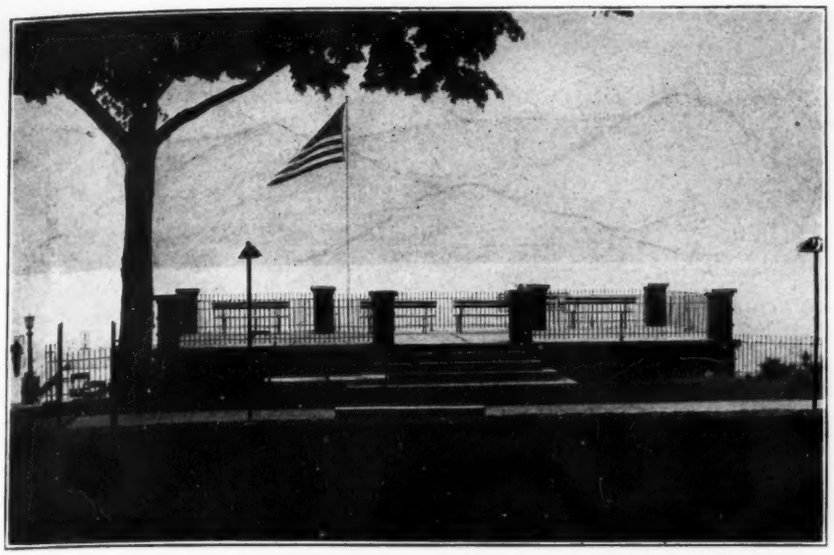
Location of the plant had to be 1½ miles from the center of the Village. This was the only suitable area of adequate size and removed from the residential section. Test pits dug at the site showed the soil to be sand to a depth of at least 25 feet.

Elevation at the site of the treatment plant is about 500 feet above sea level. Being 180 feet above the lake



The Main Sewage Pumping Station of Lake George, N. Y.
(Had to be located in the public park on the lake edge.)

*With Morrell Vrooman, Consulting Engineer, Gloversville, N. Y.



Not a Band Stand—But the Roof of the Sewage Pumping Station.
(Here residents and visitors sit to view the scenery, a sun-set—or, just to sit. Only complaint so far: Not enough seats!)

shore gave rise to an interesting pumping problem. No standard sewage pump could be found to deliver raw sewage against a total head of 200 feet and do it economically. Consequently, an intermediate or relay pumping station was built at the location determined as midpoint in total head between the main pumping station and the disposal plant.

Pumping Stations

The main pumping station houses a Chicago Comminutor, bar screen by-pass, chlorinator for pre-chlorination, sewage pumps, emergency storage basins, and comfort station. Operation of this station is fully automatic.

The raw sewage flows by gravity into the Comminutor channel, where the large solids ordinarily caught on bar-screens are shredded. A bar screen acts as an emergency by-pass in case of failure of the Comminutor or the power supply.

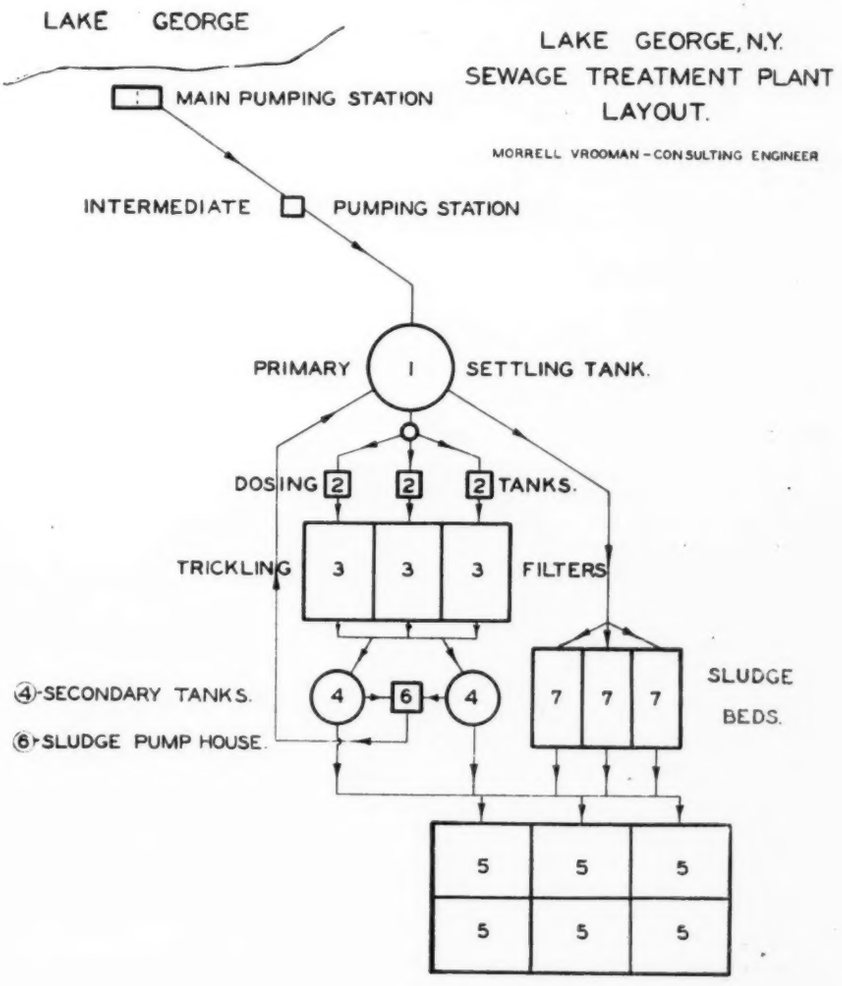
Chlorine solution is injected at the intakes of the three sewage pumps. The chlorinator is automatic and arranged to start and stop when any of the pumps start or stop.

The three sewage pumps are the vertical centrifugal non-clogging type driven by electric motors. Operation is through automatic electric float controls. The total operating head for each pump is 100 feet, and the three pump capacities are 200, 300 and 500 gallons per minute.

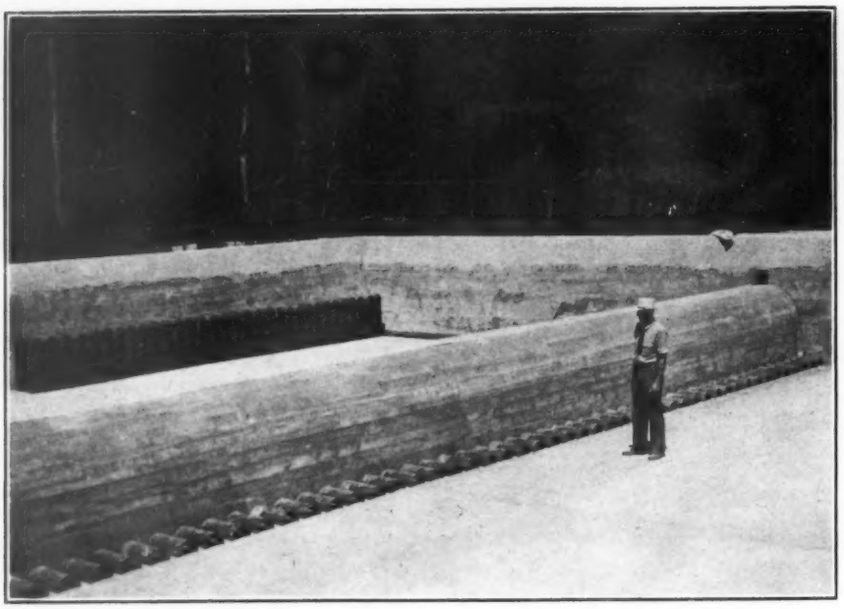
A variable pumping arrangement is necessary to take care of the great increase of summer load over winter load. In the winter season the float switches are set to use the 200 GPM pump for normal pumping, the 300 GPM pump throwing in to aid the smaller pump in taking care of sudden loads, and the 500 GPM pump as a reserve throwing in only in case of failure of one or both of the smaller pumps. In the summer season the float switches are set to use the 300 GPM pump for normal pumping, the 500 GPM pump throwing in to aid the smaller pump in taking care of sudden loads, and the 200 GPM pump as a reserve throwing in only in case of failure of the 500 GPM pump.

Protection against failures in pumping equipment or power supply has been provided. The pumping station houses two emergency storage basins of 10,500 gallons capacity each. Should the Comminutor and pumps be forced to shut down, the raw sewage will flow through the bar screen and into the pump pit. There it will rise to overflow into the two storage basins until pumping is resumed, when they are again emptied. The basins will take care of a maximum winter flow of 3½ hours and a maximum summer flow of 1 hour.

This apparatus, plus comfort stations for men and women, is housed in an attractive building of red tapes-



Key Layout Sketch of Lake George's Treatment Plant.



One of the Sprinkling Filters showing drain tile and central channel.

try brick with concrete trim (see cuts). The roof is a flat concrete slab with an ornamental iron railing. This structure is situated on the lake shore in the Village park. The rear of the building is set in a bank, and visitors to the park can stroll out on the roof of the pumping station, sit down on settees placed there, and enjoy an excellent view along the lake front.

The Village residents point out the sewage pump station as one of the attractions of the park, along with the outdoor theatre and the shuffleboard courts. There has been no complaint of odor from the station. However, the roof has been so popular as an observation platform that there have been complaints on the insufficiency of seating facilities.

Intermediate Pumping Station

The intermediate pumping station is located as midway in total pumping head between the main pumping station and the disposal plant. It receives the chlorinated sewage from the main pumping station and forces it on to the primary settling tank at the plant. This station has pumping equipment and controls which are exact duplicates of those at the main pumping station.

Treatment Plant

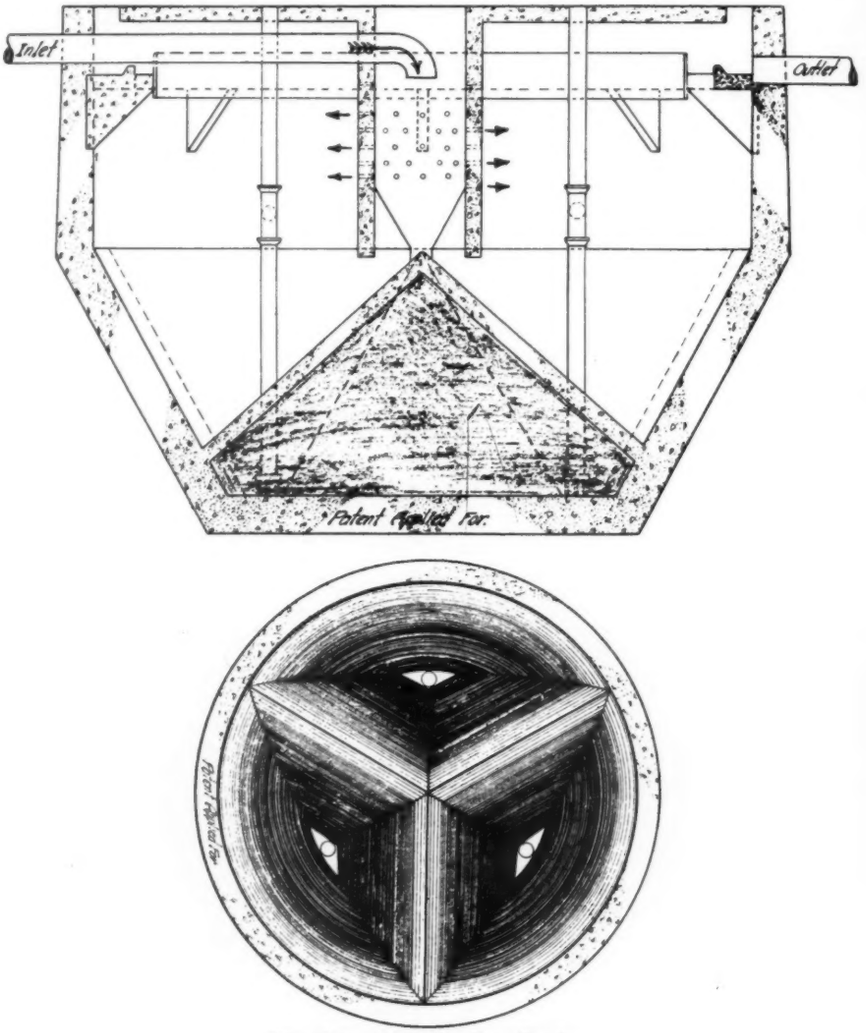
The plant is designed for a capacity of one-half million gallons per day. It includes a primary settling and digestion tank, 3 dosing tanks, 3 trickling filter beds, 2 secondary settling tanks, 6 natural sand seepage beds, also a sludge pump house and a 3 section sludge bed.

As an aid in following this description of the features of the plant, reference numbers are indicated which refer to the accompanying layout sketch of the treatment plant.

Primary Settling Tank (No. 1). This is a two-story tank of the Imhoff type. It receives pre-chlorinated sewage from the intermediate pumping station. It is circular with an inside diameter of 36 feet and a working depth of 29 feet.

Dosing Tanks (No. 2). The settled sewage flows into standard design dosing tanks. There are three units, each having 48 square foot area at maximum discharge line and an effective nozzle head of 7.2 feet. For flexibility of operation the three units were provided, only one dosing tank being used during the winter season.

Trickling Filters (No. 3). Each dosing tank discharges into its own rectangular trickling filter of 4,300 square foot area. This gives a total area of 12,900 square feet for the three beds. Each bed has an effective depth of 6 feet. The sewage is applied through ¾ inch fixed nozzles. Slotted tile and sloping floors drain the liquid into a combination drain,



The Secondary Settling Tanks.
(A section through the circular center-fed clarifier, and (below) the novel and economical prismoidal three-pocket sludge concentration chamber, as it appears from above.)

ventilating and cleaning channel at the center of each bed. This channel is approximately 3½ feet by 4 feet and enables the plant operator to clean any of the tile drain lines with rods or hose.

Valves are provided in each of the three effluent channels so that the beds can be flooded. By such flooding the beds, flies are destroyed, this being the simplest known solution to a troublesome problem.

During the winter season only one trickling filter and its accompanying dosing tank are used. Winters in this locality are unusually severe with temperatures often falling to 25 degrees F. below zero. As a protection against freezing, wood horses 5 feet high are placed on the top of the filter bed and covered over with 1¼ inch rough boards laid loose. With no other protection against the cold, the temperature was observed to be 36 degrees F. inside the cover on the bed when the outside temperature was 18 degrees F. below zero. This method of covering has proved to be an economical and satisfactory method of protection.

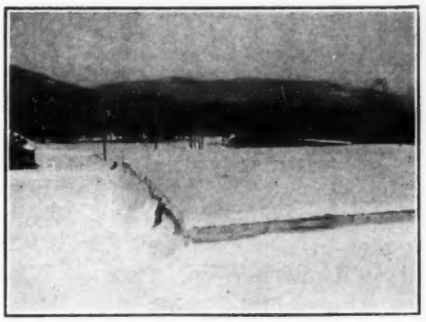
Secondary Tanks of Unique Design

Secondary Tanks (No. 4). The trickling filter discharge enters two secondary tanks. Each tank is 22 feet inside diameter and 14 foot total depth. The method of distribution of the entering sewage is through small ports in a center cylinder.

New design is found in the unique sludge collection compartments constituting an improved feature. (See cuts.) Three triangular prisms of concrete in the bottom each of these two tanks collect and concentrate the solids. The 60 degree slopes of the sides of the prisms form a point at which the solids must accumulate for withdrawal in their most concentrated state.

This design was predicated on a considerable saving in construction and further savings in operating costs. This bottom eliminates the necessity of a mechanical thickener or cleaner, or building an expensive deep frustrated cone structure.

This new type of sludge collection tank has now been in successful operation for about two years. Records of operation show a high removal of suspended solids with but little of the operator's time chargeable to the care of the secondary tanks. [This type of tank constitutes an innovation in sewage treatment and is being patented by Morrell Vrooman who originated the idea and perfected the design.—Ed.]



One of the Sprinkling Filters Under Winter Cover.
(Minus 18 outside; plus 36 inside.)

A Plant Without a "Final Effluent"

Natural Sand Seepage Beds (No. 5). From the secondary tanks the final effluent flows into seepage beds for final disposal. There are 6 beds each of approximately 12,000 square foot area, making a total area of 72,000 square feet. The natural soil was found to be sand of fairly good seepage characteristics, which composition extended more than 25 feet in depth. Consequently, the bed area proper was constructed by merely stripping off the top soil and leveling up the exposed sandy soil. These beds easily absorb all of the final effluent from the secondary tanks and nothing in the way of visible flow leaves the plant. The disposal is complete.

Operation with two beds during the winter has prevented freezing. Layers of ice form on the top, but this ice will "float" and not form in the sand of the bed.

Sludge Pump House (No. 6). This building houses the electrically driven sludge pump, tools, and laboratory equipment. The sludge pump has a two speed double rotor motor.

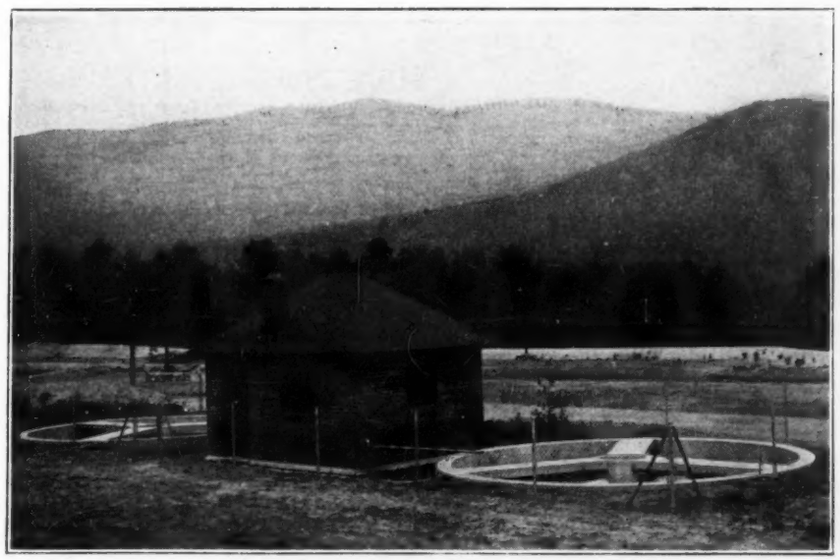
The higher speed is used when it is desired to pump the clear liquid from the top of the secondary tanks into pipe lines providing water for washing down purposes. Fire hose is attached to the three hydrants on these pipe lines from which the operator secures water at sufficient pressure for washing-down any of the plant units. Use of the treated sewage liquid has made an effective and economical substitute for a water supply, and eliminated the necessity for an expensive water line extension from the end of the local water system to the plant site.

The lower pump speed is used to pump the settled solids from the bottoms of the secondary tanks back into the primary settling tank.

Sludge Beds (No. 7). The 3 sludge beds each have an area of 1,100 square feet or a total area of 3,300 square feet. This area was based on 3,300 population as the weighted average of the fluctuating population. The beds are standard design, with drain tile discharging into the sand filter beds. The sludge is drawn by gravity from the primary settling tank into these sludge beds. Disposition of the sludge is made on the grounds at the plant.

This plant is an interesting illustration of how *complete* treatment may be provided for a small community. The final effluent becomes ground-water which in all probability seeps, eventually, to some watercourse as a highly purified liquid which can not be identified as a sewage effluent.

A worthy feature of the plant, as a resort or institutional plant, is its high degree of flexibility and attainable operating economy.



The Twin Final Clarifiers with the Unique Prismoidal Bottoms.
(Between the clarifiers is the pump house with the dual use sludge—effluent pumps. Chlorination is provided at the main pumping station in the Village Park.)

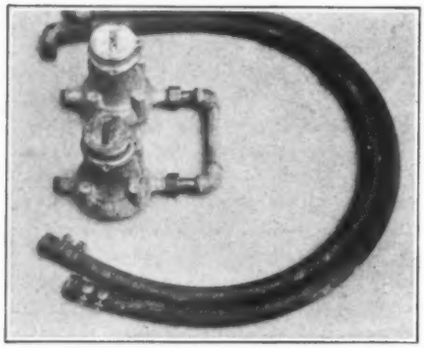
FLEXIBILITY

By D. R. TAYLOR
Plant Superintendent
ROANOKE, VIRGINIA

Dear Bill:

You can cease to worry about the apparent restricted use of your Neptune Recording Register. With a little extra trouble, a gadget that is easy to make, and a "dog house," which is also easy to make, you can not only use this recorder with any make of ⅝-in. meter, but you can also test the service meter while you are recording the consumption through it.

Purchase from the manufacturer a ⅝-in. meter with a main casing that will accommodate a seven spindle register and mount the recorder on this meter.

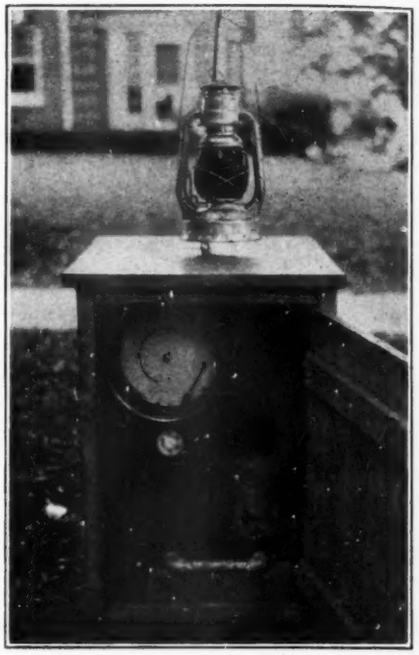


Gadget and Rubber Hose Used to Connect the Recording Register

Photograph No. 1 shows the gadget, which is easily constructed, with two ½-in. plain ells, one ½-in. nipple, and two ⅝-in. meter connections. Each of the two pieces of rubber hose has a ⅝-in. meter connection at one end of it and a ¾-in. street ell attached to the other end of it.

With this equipment you can readily connect the customer's service meter in series with the meter on which you have your recorder mounted. Both may be housed in a small box set over the meter setting if the meter is located at the curb. We clamp the box from the inside to the iron meter box so that the box housing the equipment cannot be turned over or shifted by any one who may be overcome with curiosity, and likewise to protect the equipment from the elements. We lock the door, hang a red lantern on top of the box, and there is nothing to worry about until the time arrives to change the chart the next day. We have never had any suits because of this sort of temporary sidewalk obstruction.

So, Bill, don't let anybody tell you that the Neptune Recorder cannot be used with any other make of meter except Neptunes. I presume that we all learn something every day, and often times it is the old, old story of necessity being the mother of invention. I heard a well-known economist say the other night in an address before a large gathering that we all had a lot to learn. For instance, he said that we crawled up through our shirts for 2,000 years before some one had sense enough to split them up the middle and sew buttons on them.



The Recorder Installed

The service meter is connected in series with the meter on which the recorder is mounted.

I am extremely anxious to learn what degree of success you obtained in cleaning your filter beds with the sulphur dioxide method.

Sincerely,

"Tom."

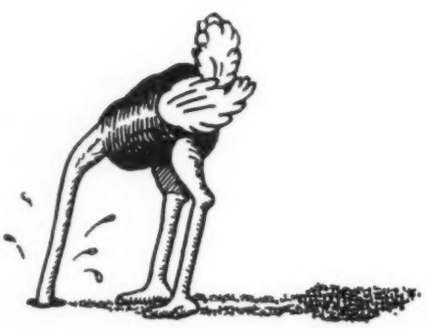
SUCCESSFUL WATER AND SEWAGE EXECUTIVES DON'T DO THIS

(But Neither Do Ostriches)

By W. F. SCHAPHORST

When I was a youngster in school I was taught that when in danger ostriches actually bury their heads in sand. It was explained that the ostrich's theory was that if he couldn't see the pursuer, the pursuer couldn't see him.

It was only recently that, while reading up on the habits of ostriches in an encyclopedia, I learned that the whole thing is just a "story". Ostriches do *not* bury their heads as claimed and as we have seen pictured many times in magazines, books, advertisements, and elsewhere.



Thus, for instance, in advertisements, ostriches have been shown time and again in the pose as pictured in the accompanying sketch and we have been told, "Don't be like the foolish ostrich; look facts in the face," or words to that effect. And I, for one, really believed that the picturization was true. I have always felt sorry for ostriches.

So, of course, this bit of contradiction was noted with considerable relief, and with such interest that I thought many water and sewage officials might be glad to know that ostriches are not actually as stupid as they have been represented to us.

HERE'S HOW NORTH TARRYTOWN, N. Y. CUT THEIR SEWER-LINE COSTS···

LIGHT IN WEIGHT, Transite Sewer Pipe is easily handled. Its long, 13-foot lengths reduce the number of joints required for the system. Villard Construction Company, contractors, found that these advantages made laying to exact grades easier . . . that they helped speed up work and reduce costs.

FLATTER GRADES are possible on this North Tarrytown sewer line, because Transite has an unusually smooth interior surface. Sewage flows freely at all times. And Transite joints are exceptionally tight . . . keep infiltration to a minimum.

Faster, more economical installation, exceptional resistance to soil corrosion made possible by the use of J-M Transite Pipe

UNUSUALLY severe conditions at North Tarrytown made the selection of sewer pipe a difficult problem. Because the line runs through a filled salt marsh, soil is unusually corrosive and there is danger of a large amount of infiltration. The ground is low, requiring exceptionally flat grades. And speed of construction was important.

To meet all these requirements, engineers Lawlor, Baulsir and Raisch selected 4,500 feet of 14″ and 20″ J-M Transite Pipe for the intercepting sewer. Made of asbestos and cement, this durable material offers high resistance to corrosive soil action. It is supplied in long, light lengths that speed up work and reduce the number of joints in the line. Furthermore, joints stay tight and, in many cases, because of Transite's unusually high carrying capacity, grades can be flatter, trenches shallower or smaller pipe may be used.

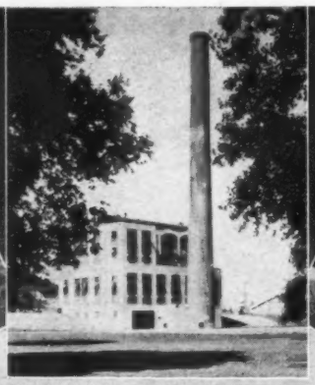
Before you plan your next sewer line, check up on J-M Transite Pipe. Let the facts show how it provides better, lower cost sewage disposal. Write for brochure TR-21A. And if you are interested in Transite Pipe for water lines, send for brochure TR-11A. Johns-Manville, 22 East 40th Street, New York, N. Y.

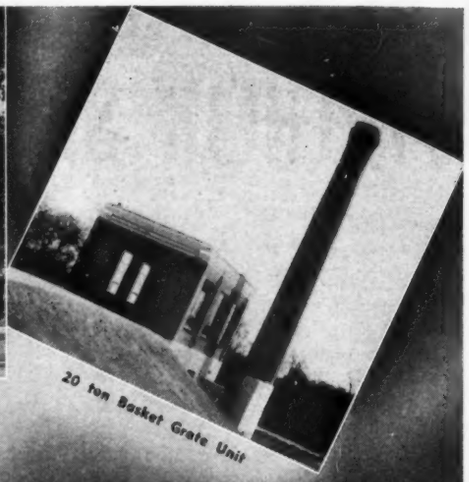
Johns-Manville

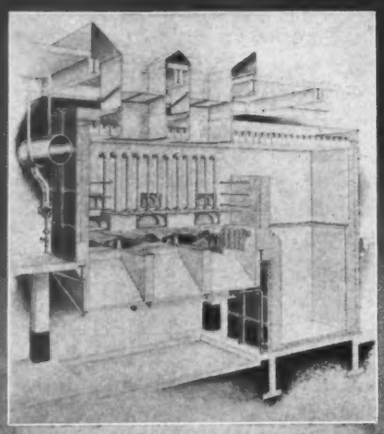
TRANSITE PIPE

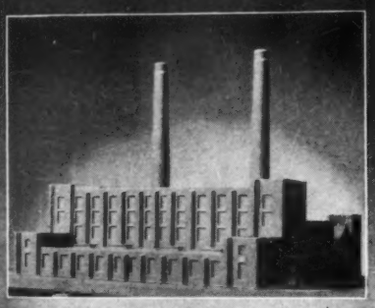
The MODERN MATERIAL for Sewer and Water Lines

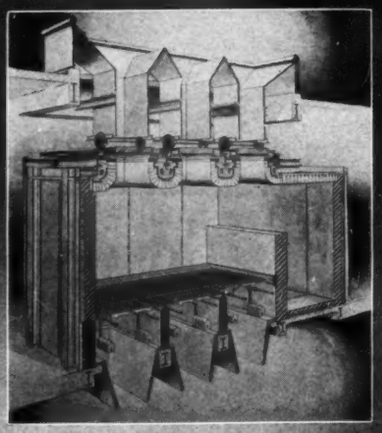
90 ton Basket Grate Unit


150 ton Basket Grate Unit


20 ton Basket Grate Unit


Nichols Basket Grate Unit


600 ton Continuous Grate Unit


Nichols Continuous Grate Unit

Nichols Refuse Incineration Plants Have Capacities of 20 to 600 Tons Daily

They provide communities with a safe, sanitary, easy and economical method of disposing of municipal garbage and rubbish without objectionable smoke or odors.

The fact that the Nichols design is flexible including either basket grate or continuous grate types assures an installation suitable to overcome local geographical, economic or seasonal conditions.

On problems involving the disposal of any kind of municipal solid wastes — including garbage, rubbish and the sludges of sewage and water treatment plants — communicate with "Incineration Headquarters".

NICHOLS

ENGINEERING & NERCO RESEARCH CORP.

60 WALL TOWER NEW YORK, N. Y.

A SIMPLE CHLORINE DEFICIENCY ALARM

By H. O. JOHNSON and F. M. JABLON*
GREAT NECK, LONG ISLAND

THE present day chlorinators used in water and sewage treatment plants are truly marvelous mechanisms. They take chlorine in the form of gas, under pressure varying from almost zero to 140 lb. per sq. in., and water with widely fluctuating temperature and pressure; and, often operating under extremely adverse climatic conditions, will deliver the predetermined amount of disinfecting solution with almost uncanny accuracy. Any interruption of this discharge of disinfectant results in a slug of unsterilized effluent being delivered to the receiving body of water. Or, failure in odor control chlorination will bring on complaints.

In large plant operation chlorine is usually drawn from one ton containers, and the operating routine and attendance is such that there is a very small possibility of a break in the continuity of the chlorine supply to the chlorinators. In the smaller plants, however, different conditions exist and the dangers of flaws in operation are ever present.

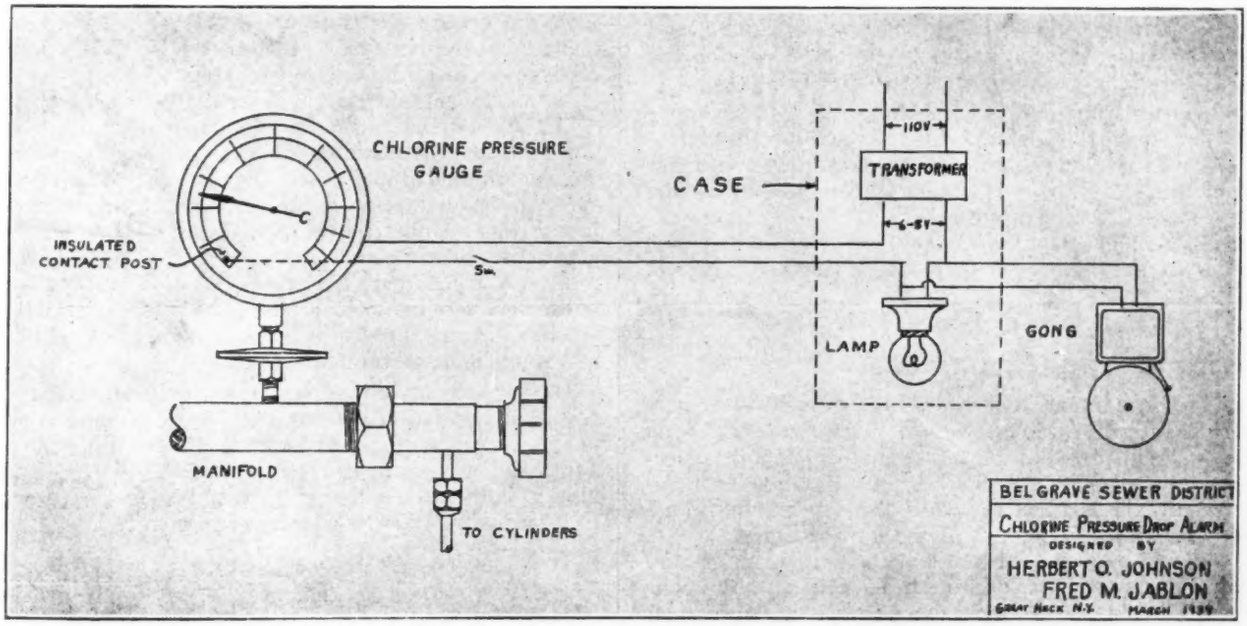
The *exact* time that a cylinder of chlorine will run out cannot be predicted, although there is a fairly uniform drop in pressure until the cylinder is nearly exhausted and then the pressure decreases rather abruptly. Consequently, unless the operator is on hand in the chlorinator room waiting for the cylinder to run out and make the change over to the full cylinder, there is apt to be a period of time when chlorine is not being applied. The duties of a small plant operator are many and varied and the press of other work may cause him to forget about the chlorinator for a time so that the period of nonsterilization may extend considerably.

The Belgrave Chlorine Deficiency Alarm

At the Belgrave plant an amazingly simple and reliable gadget was devised to notify the operator in charge that the chlorine cylinder has run out. A standard chlorine pressure gauge was wired to an ordinary doorbell transformer, lamp and gong as shown in the accompanying sketch. The lamp was installed in the laboratory and the gong on the outside of the building. In operation two cylinders are kept on the scale and connected at all times, one in service and the other as standby. When the feeding cylinder runs out the pressure drops to zero and the indicating arm in the gauge makes contact with the insulated zero post and operates the lamp and the alarm gong. The latter can be heard at any part of the plant. The operator cannot ignore the gong and proceeds to the chlorine room and closes the empty tank valves and turns on the standby. The empty cylinder is replaced at once by a full one as the standby.

When the cylinder runs out of gas and the pressure drops to zero there still remains under the bell of the Wallace & Tiernan Vacuum Chlorinator sufficient gas to make chlorine solution for several minutes, giving ample time for the operator to reach the chlorinator room and make the changeover. Since the installation of this "gadget" chlorination at this plant has been a continuous process, in fact as well as in theory.

* Inventors Johnson and Jablon are respectively Superintendent and Chemist of the Belgrave Sewer District, Great Neck, L. I.



Chlorine Pressure Drop Alarm.
(This gadget won for its inventors first prize in the N. Y. Sewage Works Association Gadget Contest.)

The Editor's Comments

A DEBILITATED POLLUTION BILL

THE Barkley Water Pollution Control Bill (Senate 685) was passed by the House of Representatives on March 1st; but, not without major debilitating alterations made to it in the Rivers and Harbors Committee of the House before it was reported out, and with a somewhat questionable amendment added on the floor.

(1) The bill, as passed in amended form, creates a Division of Water Pollution Control in the U. S. Public Health Service, with a commissioned engineer as Director. It provides $250,000 annually, after June 30, 1941, to operate the new Division for the purpose of making investigations and studies. [This compares with a $300,000 appropriation in the bill which was passed by the Senate and referred to the House May 1, 1939.]

(2) The appropriation of $700,000 per year to be allocated to State Departments of Health, to be finance survey work, investigations and promotion of pollution abatement, has been completely eliminated from the bill. However, the Division can use some part of its appropriation in investigations jointly with State or interstate agencies, or for such agencies.

(3) All provisions in the bill for grants-in-aid and/or loans to municipalities and other polluting bodies or corporations, to assist in and encourage construction of treatment works recommended by State Health Authorities and approved by the U. S. Health Service, were also completely eliminated. A provision for R.F.C. loans and purchase of securities of municipalities was substituted therefor; but such assistance, we believe, has always been available to those in position to offer adequate security. Stipulations governing R.F.C. loans nor the rates of interest will attract many municipalities, and industrial corporations are not eligible to apply for R.F.C. loans, as we interpret the amended bill.

(4) The amendment of importance, and questionable as to acceptance, which was added to the bill is that introduced by Mr. Gavagan (New York) and further amended by Mr. Mundt (R.) of Illinois, author of one of the more drastic pollution bills which was never reported out. The amendment absolutely prohibits any *new* sources of pollution after June 30, 1941, and, towards such ends, gives the Federal Government power of enforcement through the medium of Federal Court injunction, whenever such is requested by State or Federal agencies responsible for water quality.

The second amendment added was cooperatively prepared by Representatives Keller (Illinois) and Bland (Virginia). It provides that no stream compact or agreement between States shall be legally binding until approved by the respective State legislatures first and, thereafter, by the Congress of the United States.

As a result of the Mundt amendment, bringing the Federal injunction phase into the bill, it must go to conference. From those who are qualified to express an opinion it is thought that the House Conference Committee will agree to strike out the Mundt amendment in order to assure acceptance of the bill by the Senate Committee and, thereby, insure its final passage during the present session of the Congress. Unless the amendment is removed or further modified it is improbable that any pollution act will come out of the present Congress.

From all appearances the President wishes a stream-pollution bill passed, and considers the House revisions of the Barkley bill thoroughly acceptable, in that the revised bill carries no appropriations beyond that of $250,000 annually to the U. S. Public Health Service, and all financial aid to municipalities through the grant system has been dropped, as well as the $700,000 originally intended to aid State agencies to carry forward anti-pollution programs coordinated by the new Federal Division of Pollution Control. It is not believed that the President looks with favor on the "big-stick" amendment and will probably suggest its deletion by the Conference Committee. Many believe that the members representing the House on the Committee will approve the deletion of the Mundt amendment. The Keller-Bland amendment is a very sound one.

We are strongly of the opinion that the emasculated Barkley Water Pollution Bill (S. 685), which was almost a year ago passed by the Senate, has now become more of a political baiting than a pollution abating device. Very definitely is such the case in so far as its immediate usefulness may be concerned. However, it does constitute a start in the right direction at least; and, if the present economy wave in Congress (for the present very much heeded in the White House) is to be extended rationally in all directions, stream control authorities and those suffering directly as the result of pollution must realize that the Federal Government has already spent a tidy sum in fostering pollution correction during the past 6 years. If a genuine start is being made in getting industrial pollution reduced, to the extent that Federal assistance has already made possible in the direction of clearing up municipal pollution, then we should feel that somewhat slow motion for the immediate future may be justified as a sound move. And, before any widespread action proceeds the new Division will have had opportunity to "try its wings" and make sound plans, thereby reducing waste motion and loss, which hurried spending produces in such programs for which "ready machinery" is not available at the launching.

If the present bill passes it will represent the first pollution legislation coming out of the Congress in 20 years. Let it be hoped that there will be sufficient give and take between the conferees to render the bill acceptable to both sides and that July 1, 1941, will see a real program of pollution abatement ready to GO.

L. H. Enslow

CLAIMS.... or PERFORMANCE?

You don't have to depend on claims in buying Activated Carbon. Here's how you can check

PERFORMANCE!

The Threshold Odor Test, the Carbon Feed Chart, the Darcograph—with these three methods, you don't have to take anyone's word on carbon performance. You can determine for yourself!

For best results in palatability control, put these three methods to work now. You can find out quickly which carbon does the best job on the water you have to treat. And you can check the uniformity of every shipment, to assure uniform effectiveness.

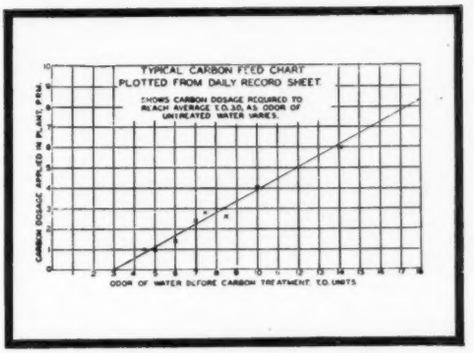
Send for a Darcograph Set today, and for information on how to conduct the Threshold Odor Test. Prove to your own satisfaction that HYDRO-DARCO gives best palatability control per dollar!

Hydrodarco Reg. U. S. Pat. Off.

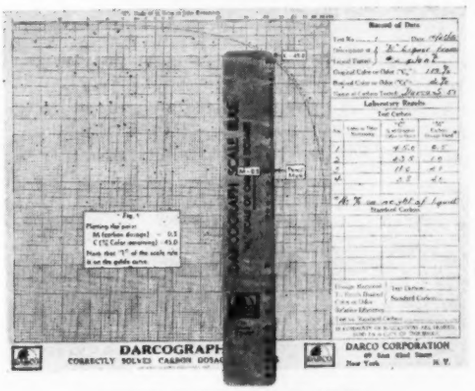
HYDRODARCO

The activated carbon specially made for water treatment, Hydrodarco now comes in a new-style bag sealed and taped with Latex tape to insure against sifting.

THRESHOLD ODOR TEST


TYPICAL CARBON FEED CHART
PLOTTED FROM DAILY RECORD SHEET
SHOWS CARBON DOSAGE REQUIRED TO
REACH AVERAGE T.O. 3.0, AS ODOR OF
UNTREATED WATER VARIES.
CARBON DOSAGE APPLIED IN PLANT, P.P.M.
ODOR OF WATER BEFORE CARBON TREATMENT, T.O. UNITS

CARBON FEED CHART



THE DARCOGRAPH

Attend the 60th Annual Meeting American Water Works Association, Kansas City, Mo., on April 21-25.

DARCO

DARCO CORPORATION

60 East 42nd Street New York, N. Y.

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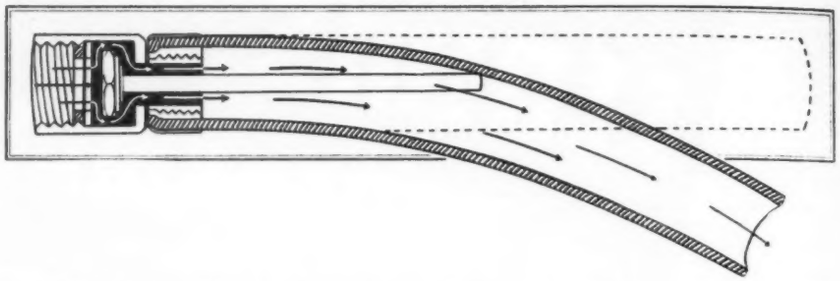
EQUIPMENT NEWS

Lonn Water Savers Novel Waste Preventers



● The manufacturer of the simple but effective water-waste reducing nozzles known as "Water Savers" will possibly find it hard to understand the interest of water purveyors in anything which is designed to reduce water consumption. But, he will probably realize the importance of reducing needless waste of water, even of metered water at times, when reserves are drought depleted or peak consumption constitutes an uncomfortable load. He should, however, appreciate that every bit of water used on city owned properties, schools, fire departments, playgrounds, municipal garages, parks, etc. (in fact by the Water Department itself) too generally constitutes a dead loss to the Water Department.

The unique "Water Saver" nozzles designed for curtailing water waste from hose lines, are a production of the Lonn Mfg. Co. of Chicago.

The accompanying sketch illustrates the principle of this socalled nozzle, which is in reality a piston valve attachment for the nozzle end of hose lines. The short length of rubber hose is normally straight. In such position the compression valve remains tightly closed. When water flow is desired it is only necessary for the operator to hold the discharge section in a slightly curved position. The long nozzle stem is thereby pushed in, as is clearly evident, and water flows. A slight bend produces slight flow; more bend greater flow. Just the pull of the length of hose from the ground to the operator's hand is sufficient to cause a bend that holds the valve practically wide open. And, the great feature is that the instant the hose is dropped or laid down the water flow automatically stops. Pick it up, and the flow starts again.

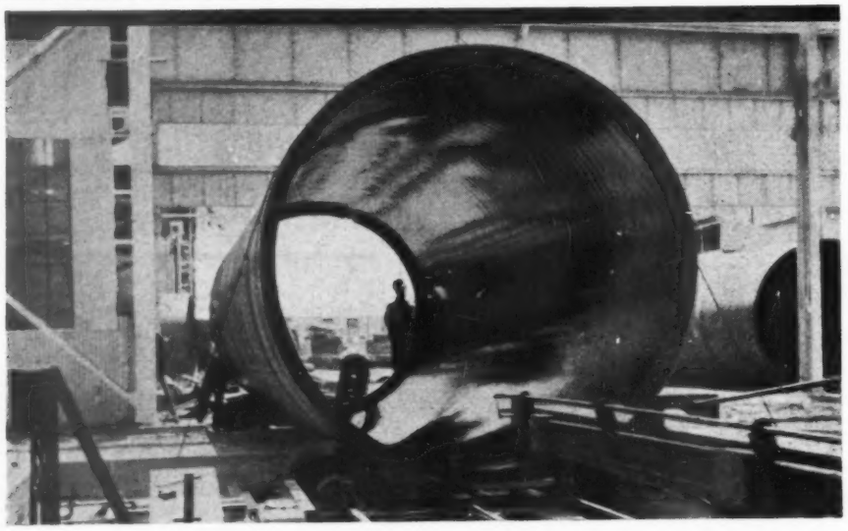
One can readily see the decided possibilities of water saving by these "Water Saver" nozzles in numerous industrial plants, in automobile washing stations, laundries, hotels, schools, garages, parks, etc. The manufacturer points out that rubber hose lasts longer when kept under constant internal pressure; also, the waste of time in shutting and opening valves, when all that is necessary is to drop the hose if equipped with a Lonn "Water Saver" nozzle, which holds pressure on the hose.

These interesting nozzles (also designed for compressed air use in shops) are best understood from the illustrated circulars of the manufacturer. For such, showing sizes and prices, address Lonn Mfg. Co., 625 W. Jackson Blvd., Chicago, Ill.

Small Lubricated Plug Cocks

● Merco Nordstrom Valve Company are now producing their well known pressure lubricated plug cocks in small sizes for high pressure steam, gas or water lines.

The new ¼" and ⅜" sizes were developed to provide leak-proof cocks for gauge lines. However, these units have many other applications, as positive opening and closing valves under any condition of pressure and temperature. Particularly are these valves of interest where there is a tendency toward corrosion or wear, and



WATER WORKS PIPE AND CONDUITS
Made Safe From *Rust and Corrosion*

REILLY PRIMER and PIPE ENAMEL have successfully withstood every test of dependability in the laboratory and in service. These coatings bond firmly to inner and outer surfaces of steel and cast iron pipes, conduits and tanks, providing a hard, smooth, elastic protective coat which neither moisture nor soil acids can penetrate. They withstand wide temperature variation without sag, chipping or peeling, and are highly resistant to abrasion. Inner surfaces of pipes remain free from tuberculation and permanent full flow is assured.

FREE BOOK ON REQUEST
Gives information about the characteristics and specifications of the various REILLY coatings, and application procedure. Illustrated with many views of coating methods and installations. Interesting and informative.

REILLY TAR & CHEMICAL CORP.
INDIANAPOLIS, INDIANA

Reilly PRIMER AND PIPE ENAMEL

consequent leakage or failure to completely open and close at a time when most needed.

These leak-proof plug-cocks, like the well known larger units, open and close with ¼ turn of the plug, the latter being

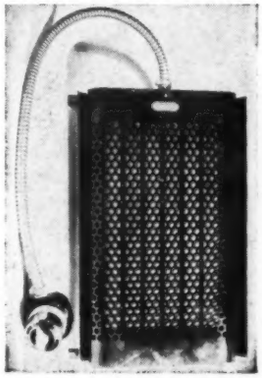
precision machined from stainless steel. Any tendency of the plug to stick is quickly overcome by a turn of a screw which forces the self contained lubricating grease under the bottom of the plug to lift it just sufficiently to break the seal and no more.

For more adequate description and illustration, write Merco Nordstrom Valve Co., 400 Lexington Ave., Pittsburgh, Pa.

New Heaters by Westinghouse (Wall and Floor Types)

● A new line of wall and floor mounted air-heaters, has just been announced by Westinghouse.

The ease of installation and clean, steady and odorless heat makes these units



particularly desirable for use in valve houses, chlorinator houses, scale rooms, pumping stations, pipe galleries, garages, crane cabs, etc. They are designed for use with either a three-heat hand switch or a Westinghouse Type AA thermostat.

The wall mounted heaters range from 25⅛ to 31¾ inches in length and are from 10⅜ to 16⅞ inches high. They have a rating of 1,000 to 4.500 watts and operate on 115, 230 or 440 volts. The floor mounted air heaters have approximately the same heating surface in inches and the same wattage ratings as the wall mounted units, but they are only made to operate at 115 or 230 volts.

Formulae to determine the proper size heater for individual installations, and additional information, may be obtained from the Heating Division, Westinghouse Electric & Mfg. Co., Mansfield, Ohio.

THE ROYER

Convert Sewage Sludge Into a Cash Asset!

If you bury, burn or dump your sewage sludge, it is costing money to dispose of it. You can not only eliminate this cost, but turn the sewage sludge "liability" into an "asset" by converting it into a readily salable product with a Royer Sewage Sludge Disintegrator.

These simple, compact machines shred, mix and aerate dried sludge cake, reducing it to pea size particles that readily yield their nutritive values to all forms of plant life, removing sticks, stones and trash and loading the finished product onto trucks, wagons or piles, in a single fast operation—as fast as one or more men can shovel into the hopper.

Additionally, the moisture content is greatly reduced and the disintegrated sludge is of an ideal size and consistency for use as a top dressing and soil builder.

Many sewage plants have turned waste into profit and are selling all of the sludge produced to gardeners, florists, nurserymen, golf courses, cemeteries, parks and others in need of fertilizers and composts, at a worthwhile profit that cuts operating costs.

Write Royer today about this market and its potentiality.

ROYER FOUNDRY & MACHINE COMPANY
170 Pringle Street, Kingston, Pa.

Wisconsin Sewage Treatment Plant Converts Dried Sludge Cake into a readily salable product with a Royer.

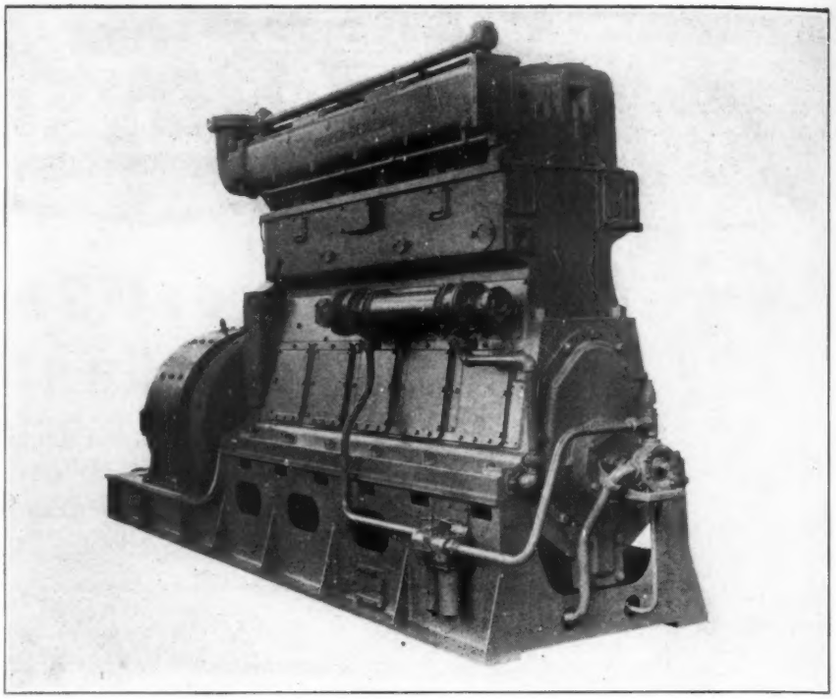
New Diesel by Cooper-Bessemer

● A new and improved Cooper-Bessemer Diesel engine has just been announced as an addition to their famed "J" line of Diesels. Amongst its features are the following:

The new "J.S." Diesel has a 9 inch diameter crank-shaft, made from a one-piece steel forging. The main bearing cap is set into the bed-plate. Separate cylinder liners of the wet type are fitted with oil-proof grommets, at both ends. to positively seal the water joints. Die-forged connecting rods have two piece crank-pin boxes, fitted with fully removable precision (shim adjusted) bearings. Piston pin bearings being two piece solid bronze shells, afford practically a full length bearing.

An entirely new feature of the Type J.S. Diesel is the oil-cooling of the undersides of the piston crowns, jacketed for that purpose. Such oil-cooling of pistons should go far in eliminating wear, warpage and sticking of rings, and scuffing of liners. Assured lower piston temperatures, thereby, permits higher speeds and increased horse-power output, with no danger to piston assemblies.

A tedious, consequently an oftimes neglected, maintenance task has been eliminated by the fully automatic force-feed lubrication of the entire camshaft assembly, and even the valve stems. For the exhaust valves special heat resisting steel inserts are employed. Outside water jumpers, another good design feature, are used for transferring the cooling water from cylinders to heads.



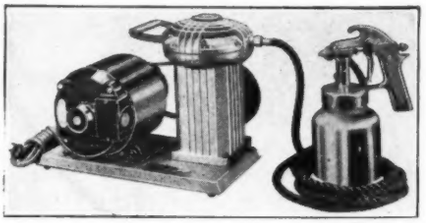
Cooper-Bessemer Type "J.S." Diesel Engine.

The fuel injection system is the well known Cooper-Bessemer (patented) Atmospheric-Relief type. The pressure on the fuel injection line is automatically regulated by throttling of the suction intake to the high-pressure pumps rather than on the high-pressure side of the pump, affording a number of advantages.

For stationary power and electric generating service the new Type "J.S." Cooper-Bessemer Diesel is offered in 5, 6, 7 and 8 cylinder units conservatively rated to produce 430 to 675 h.p. at 400 rpm.

For more complete information on the Type "J.S." Diesel, address The Cooper-Bessemer Corp., Mt. Vernon, Ohio.

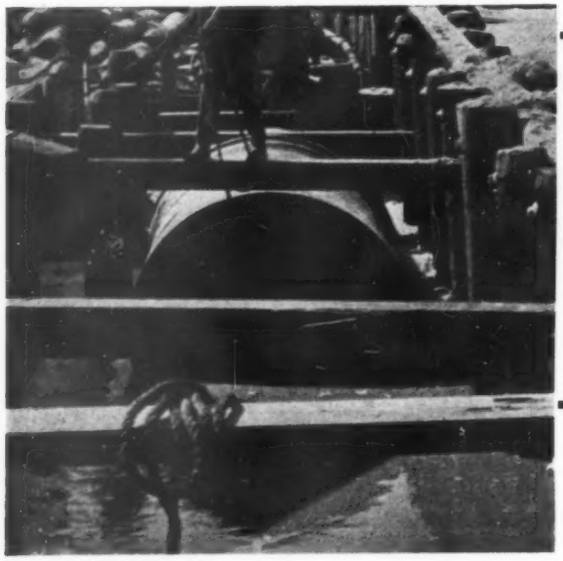
Low Priced Paint Spray Guns



● For the many light jobs requiring small, inexpensive paint spray equipment, Binks Manufacturing Co. of Chicago has designed the new ROCHE Single Diaphragm Paint Spray Outfit. The compressor of this compact new unit delivers 2.2 cfm. at 26 pounds working pressure to a new, specially designed ROCHE "J" gun. This gun handles all kinds of average viscosity paints, enamels, lacquers, calcimines, varnishes, insecticides, etc.

For those who prefer a piston type compressor, Binks offers the new ROCHE Piston Type Spray Outfit.

For descriptive literature and prices write Binks Mfg. Co., 3114 Carroll Ave., Chicago, Ill.



84" pipe—Spring Lake, N. J.

FLANGED PIPE

FLEXIBLE JOINT PIPE

BELL & SPIGOT PIPE

SPECIAL CASTINGS

SHORT BODY BELL & SPIGOT SPECIALS

Large stock enables us to make prompt shipments.

CAST IRON PIPE

SIZES 2" TO 84"

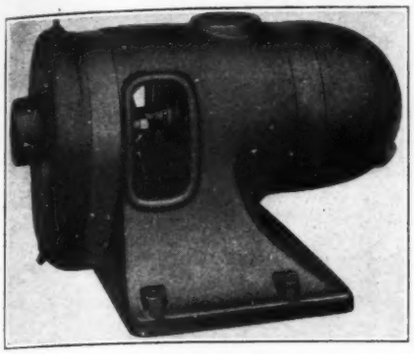
Warren Foundry & Pipe Corp.

11 Broadway, New York

Warren Pipe Company of Mass., Inc.

75 Federal St., Boston

A Unique Motor-Pump Unit

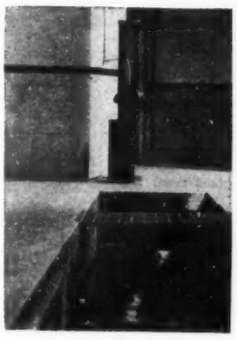


● A highly unique and ingenious motor-pump unit, is that recently announced by the Smith Meter Company of Los Angeles.

The new SMITH-WAY Centrifugal possesses several features of merit but the most interesting feature is found in the extension of the pump casing so that it surrounds the motor, which is enclosed within a hermetically sealed steel capsule. The motor is thus continuously cooled by water passing around it. The unit may be mounted in any position and is available in capacities of 20 to 200 gpm. against head up to 250 feet. On a very short motor shaft, running in ball bearings, the impeller is directly mounted.

For a Bulletin of details pertaining to this novel pump unit, address Smith Meter Co., 5743 East Levere St., Los Angeles, Calif.

Hyperbolic Weir Recorder By Cochrane



● The accompanying illustration pictures one of the twin hyperbolic weirs installed at the Lackawanna, N. Y. Sewage Treatment Plant and, beyond. the transmitter of the Cochrane Electric Flow Meter.

The use of the proportional hyperbolic weir at the end of the grit-chamber produces flow proportional to the head behind the weir. The electric flow meter transmits these head readings to the integrating and recording unit which records all flows in gallonage. The instrument is designed to chart all normal flows at a short radius, in order that abnormally high flows (due to storm, etc.) can be completely charted.

For further details concerning this scheme of controlling channel velocities and recording flows, write Cochrane Corporation, 17th and Allegheny Ave., Philadelphia, Pa.

Improved "Stabilflo" Valves

● An improved line of "Stabilflo" Valves for rate of flow control of water, gas, steam or other fluids, has been announced by The Foxboro Co.

Equipped with a wide range V-port plunger, the valve has a rangeability of 50 to 1. When this valve is lifted off the seats, the initial clearance flow is 2%. From this 2% flow to 100% flow, the valve gives equal percentage increases in flow for equal amounts of valve lift.

The body and plunger of the Stabilflo valve are designed for high lift. This is absolutely necessary in order to produce a valve with wide range flow characteristics that modern automatic flow controllers require.

Accurate and efficient operation of the complete line of valves is provided by the Stabilflo floating power motor. Suspended construction of this motor eliminates the need for guides and anti-friction bearings.

Excess friction is combatted in the one-piece bonnet and stuffing box assembly. Use of a deep lubricated stuffing box, and polished stainless steel valve stem, reduces stuffing box friction to a minimum. The stainless steel gland nut and packing follower need never be more than finger tight.

Further information about this improved line of "Stabilflo" valves may be obtained by writing The Foxboro Company, Foxboro, Mass.

Hastelloy "C" Now Available in Sheets

● Rolled sheets and plates of Hastelloy "C", the corrosion-resistant nickel-molybdenum-chromium-iron alloy, can now be furnished by Haynes Stellite Co., a Unit of Union Carbide and Carbon Corporation. Until a short time ago, this alloy was commercially available as castings only. Now plates weighing up to 100 lb. each can be made, and the alloy can be produced in practically any commercial thickness.

Advantages of this alloy are that it effectively withstands strong oxidizing agents such as acid solutions of ferric or cupric salts, chlorine water and hypochlorites. It is one of the few metallic materials that will withstand the corrosive action of wet chlorine at room temperature.

In rolled form, Hastelloy "C" has a tensile strength in excess of 75,000 lb. per sq. in., and an elongation and reduction of area of about 15%. These good physical properties, coupled with the alloy's outstanding resistance to corrosive chemicals, make it an engineering material of unusual interest.

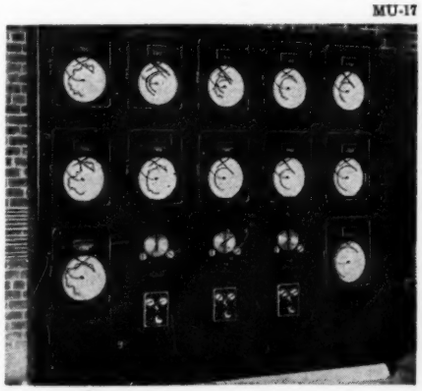
Sheets and plates of the alloy are already being used in several types of processing equipment involving severe corrosion problems. Further information about Hastelloy alloy "C" sheets can be obtained from Haynes Stellite Company, Kokomo, Indiana.

THE *Bailey Synchro-Meter* GIVES YOU *Flexibility* IN METERING APPLICATIONS

● This meter panel includes both direct mechanically operated Fluid Meters and Bailey Synchro-Meters, which are electrically operated by remote transmitters.

Wherever you have need for a central meter panel incorporating both mechanically and electrically operated Fluid Meters, it is possible to maintain uniformity and neatness by employing this system of transmitting meter and recorder readings.

MU-17



Readings of flow, pressure, temperature, liquid level and other factors are accurately and quickly transmitted from out-of-the-way places to the receiving indicator, recorder or integrator by the Bailey Synchro-Meter.

This electrical mechanism which is completely described and illustrated in Bulletin No. 194-A, can also be used to eliminate the necessity of running high pressure piping up to meter and control panels.

Write for your copy of this new Bulletin.

BAILEY METER • COMPANY •

1072 Ivanhoe Road, Cleveland, Ohio

BAILEY METER COMPANY LTD., MONTREAL

SPEEDS

Work in Bell and Spigot Jointing

Save days, waiting for that initial joint leakage to heal, by using Tegul-MINERALEAD ● With this sulfur-base compound those leaks heal **quickly.** You can go right ahead with back filling and clearing up ● Your men can swing those 10 lb. Ingots easily — and store them on the job without fear of rain or snow ● Melting pot is easily replenished without delaying work—and the Ingot form dismisses all danger of composition changes in transit ● Tegul-MINERALEAD makes tough, tight joints that smile at vibration, thermal and mechanical shock ● No other jointing compound is like this. Write The ATLAS MINERAL Products Company of Pa., Mertztown, Pa.

Plan to attend the 60th Annual Meeting of the American Water Works Association Kansas City, Mo., Week of April 21st, 1940

Tegul-MINERALEAD

LEADITE

The Pioneer Self-Caulking Material for C.I. Pipe

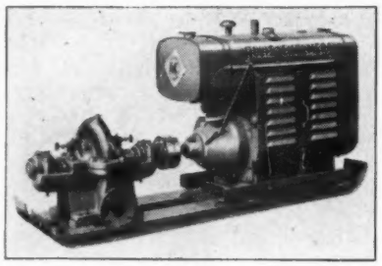
MORE MILES OF CAST IRON WATER MAINS ARE JOINED WITH

THAN WITH ANY OTHER MELTED SELF-CAULKING MATERIAL

THE LEADITE COMPANY
Girard Trust Co. Bldg. Phila., Pa.

No Caulking

New A-C Portable Engine-Driven Pumps



● To provide independently powered pumps for portable or emergency use, for construction jobs, and various applications, the Allis-Chalmers Mfg. Co. has introduced a line of centrifugal pumps driven by gasoline power units mounted on sled frames. Since these units are entirely independent of any outside source of power, they become useful also as temporary or standby units in emergencies when other sources of power fail at water or sewage plants.

Power units in five sizes (18 to 110 H.P.) assure economy in operation with a choice of fuels: gasoline, kerosene, or gas. They may also be found useful at sewage treatment plants where sludge gas is available. All power units have valve-in-head medium speed engines, with removable cylinder liners, efficient cooling systems, force-feed lubrication and a variable speed governor.

The centrifugal pumps are horizontal shaft, single stage, single or double suction pumps. To facilitate handling, the engines and pumps are mounted on a sled-like base, and are available in many combinations to meet various requirements in quantity and pressure up to 5,000 gallons per minute and 100 foot head.

A folder (Form MS 253) describing these engine and pump units may be obtained from the Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee, Wisc.

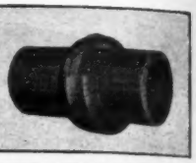
Dresser Utility Clamp

● A special design of clamp, said to be suitable for practically any working pressure or service, has been developed by Dresser Manufacturing Co. for use in stopping leakage through porous circumferential pipe-welds and small holes and leaks in pipe. Standard pipe sizes for which the style 55 clamp is available are 1¼" ID to 26" OD inclusive.

The clamp is described as consisting of two split (sectioned) followers; a heavy, specially grooved, split gasket that seals the leak; a stainless-steel, split, gasket-retaining band that encircles the gasket; a length of wire to hold the band in place during assembly; and the required number of track-head steel bolts.

Additional information is given in a Dresser folder, available on request. Address the Dresser Mfg. Co., Bradford, Pa.

WESTON

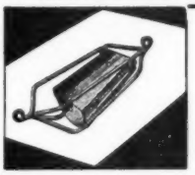


GASKET AND FORM

The Perfected Method for Making SEWER PIPE JOINTS OF CEMENT

- No jute used—gasket centers spigot.
- Definite space in each joint for cement.
- Form confines cement-grout to lower portion of joint.
- Particularly advantageous in water-bearing trenches.
- Infiltration minimized.

L. A. WESTON **Adams, Mass.**



COMPLETE SEWER CLEANING EQUIPMENT

If you need a sewer cleaning machine, sewer rods or sewer cleaning tools, don't fail to investigate our complete line before buying. Machines sold or leased. Sewer rods and hand tools sent on free trial.

Write for Catalog

W. H. STEWART

Syracuse, N. Y. P. O. Box 767 — Jacksonville, Fla. P. O. Box 581

779 Argyle Road, Windsor, Ont., Canada

EDSON'S NEW HAND PUMP

Smallest Diaphragm Pump Made, 2" Suction Open Discharge. Capacity 1400 G.P.H. Weight 50 lbs.

THE EDSON CORP'N
49 "D" Street
So. Boston, Mass.

NEW YORK: 142 Ashland Pl., Brooklyn

CHICAGO: 1061 Peoples Gas Building

Catalog "T" Gives Full Data, Also Edson Hand and Power Pumps, Suction Hose and Pump Accessories

When you think of

ALUM

... think of

ACTIVATED

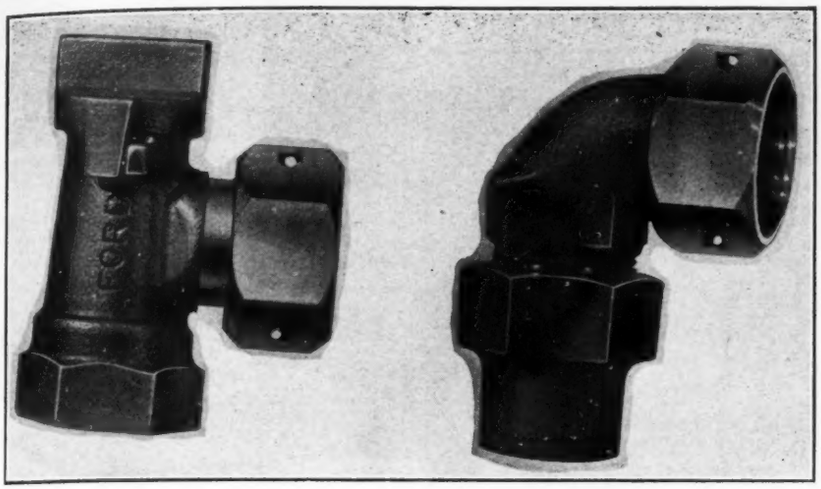
●

ACTIVATED ALUM CORPORATION

Curtis Bay Baltimore, Maryland

Ringstyle Meter Valves and Couplings

By Ford



● Ford Meter Box Co. has recently announced their novel RINGSTYLE Valves and Couplings for meter settings.

The Valve pictured above (left) connects the meter to one riser and the Coupling (right) connects the other side of the meter to the other riser. It will be evident that these improved fittings eliminate couplings and make for simplicity and neatness and, likewise, eliminate two joints. The new valve, with its key upwards, is easy to reach from above. It takes the place of the ordinary inverted ground key, and a bent coupling. The new coupling takes the place of an ordinary bent meter coupling, and an iron pipe coupling. It is evident that the use of these novel fittings saves a joint on both sides of the meter and eliminates two couplings. They come fitted with hard leather washers.

These Ringstyle units are made of bronze, similar valves having long been supplied on Ford yokes and "Coppersetters." The unique method of holding the nut onto the coupling permits several possibilities in meter couplings which are desirable.

For further details and illustrations of typical installations request the "Ringstyle Valve and Coupling" folder of Ford Meter Box Co., Wabash, Indiana.

WITH THE MANUFACTURERS

Palmer "Filter-Sweep" Being Marketed by Activated Alum Corporation

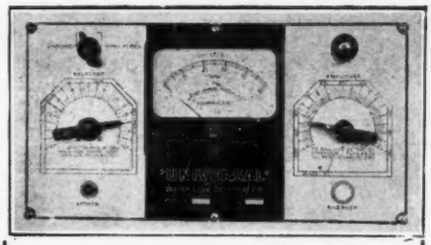
● Announcement has been received of the appointment of Activated Alum Corporation of Baltimore, Md., as national representatives of the Palmer Engineering Company of Erie, Pa., to act as sales and service agency for the Palmer revolving filter bed agitator which *Water Works and Sewerage* dubbed the Palmer "Filter-Sweep" early in the history of this useful and effective hydraulic filter bed agitator and sand scrubber.

The inventor of the "Filter-Sweep," C. E. Palmer, is a filter plant operator at Erie, Pa. His device has been constructed on practical lines, featuring simplicity but ruggedness. We have yet to learn of a dissatisfied purchaser of Palmer's "Filter-Sweeps" and take this opportunity to wish both the inventor and the live wire officers and staff of Activated Alum great success in its marketing.

A working model of this remarkably effective filter-bed agitator now becomes a part of Activated Alum's famed (and original) Travelling Research Laboratory, which occupies a trailer that covers a good part of the country. This model will also be on display at Activated's booth at the Kansas City Convention of A.W.W.A. April 21-25. It's well worth looking into.

Moore Steam Turbine Corporation Becomes a Division of Worthington

The Worthington Pump and Machinery Corporation has announced that its subsidiary, the Moore Steam Turbine Corporation, of Wellsville, N. Y., is now conducted as the Moore Steam Turbine Division of the corporation. This became effective Jan. 2, 1940. The Moore Steam Turbine Corporation was a wholly owned subsidiary of the Worthington Pump and Machinery Corporation for three years, during which the corporation's nation wide sales organization with its service facilities has increased the volume of steam turbine sales to a point where it has been necessary for the corporation to provide additional plant capacity.



WATER LEAK

detection and location problems have been satisfactorily answered by many practical water works men, since they abandoned the old fashioned listening devices, and adopted the modern and up-to-date

"UNIVERSAL METHOD"

of locating leaks, which measures leak vibrations on a visual meter. As these vibrations increase or decrease, the operator knows he is going towards or away from the leak. Likewise, he knows when he has spotted the leak.

We train your men the "Universal Method" at no extra cost.

PIPE LOCATION:—Since no one type of pipe locator will locate all pipe and fixtures under all conditions, therefore we manufacture two types. Our Energizer type locates pipe under reinforced concrete pavements. Our T-R type locates pipes, short stubs, tees, crosses and buried valves, etc.

Why not write for illustrated literature, or better yet, ask for a demonstration in your own city.

WATER LEAK DETECTOR CO.
166 N. Third Street
Columbus, Ohio

FERRIC ISCO CHLORIDE

For Sewage and Water Treatment have you tried

• ISCO •

Ferric Chloride . . . . .
SOLUTION or CRYSTAL?

FOR SLUDGE CONDITIONING—Ferric Chloride is accepted as the agent most efficient from the standpoint of performance and cost.

FOR COAGULATING SEWAGE—Ferric Chloride provides an inexpensive and effective method of dealing with plant overloads.

FOR WATER PURIFICATION—Ferric Chloride is an economical and practical coagulant, and gives quick-forming, fast-setting floc. Write

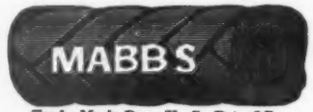
INNIS, SPEIDEN & CO.
117 LIBERTY STREET, NEW YORK, N. Y.
Chicago Cleveland Boston
Philadelphia Gloversville, N. Y.

Prevent wear and cutting of rods, plungers, shafts and valve stems by using

MABBS RAWHIDE PACKING

In Your Water Works and Sewage Plants

IT LASTS LONGER—*Is Anti-Frictional, Saves Power, Labor and Repairs. Will prove the cheapest packing that can be bought.*



Trade Mark Reg. U. S. Pat. Off.

Mabbs Hydraulic Packing Co.

Incorporated 1892

431 S. Dearborn St., Chicago, U. S. A.

ARROWHEAD Grating and Treads

Engineers' Handbook sent on request

ARROWHEAD IRON WORKS

431 W. 5th Street

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PATENTED

Quick Easy Lasting

TAPAX is the surest relief from rattling, banging manhole covers and offers you the simplest solution for noisy covers at a cost of comparatively a few cents an application. It will "stay put" for years. Ask for sample.

TAPAX MFG. CO., INC.

MAMARONECK NEW YORK

The Meter-Master

RATE RECORDER FOR WATER METERS

Send For Literature

F. S. BRAINARD & CO.

246 Palm Street, Hartford, Conn.

WITH THE MANUFACTURERS

Handling Liquid Chlorine

(A New Wall Placard)

● Pennsylvania Salt Manufacturing Co. has recently produced a new and up-to-the-minute Liquid Chlorine Wall Placard, which covers the safe handling of liquid chlorine and presents safety recommendations that are simple to follow.

The suggestions made are based upon the accident-prevention experience of this well known and long experienced producer of chlorine. It tells "What to Do in Case of Chlorine Leaks"; "What to Do in the Case of Accidents"—also what NOT to do under both headings.

The new poster is handsomely printed, illustrated in color, and strongly backed with canvas to provide durability. It measures 19½ in. by 14 in. and is brass bound for wall hanging. To users of chlorine these safety placards are supplied free, upon request. Address Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia, Pa.

J. J. Rockefeller Now Representing Clay Sewer Pipe Association

● John J. Rockefeller, former P.W.A. engineer, has been appointed promotion engineer for the Clay Sewer Pipe Association, Inc.

Prior to his service with P.W.A. Mr. Rockefeller had been employed as supervisory engineer by the Foundation Company and later with the engineering firm of Moran, Proctor and Freeman.

Mr. Rockefeller will direct district promotion service and engineering activities for the vitrified clay pipe industry in New York State. The appointment constitutes a part of a trade expansion program by the industry. His office is located at 90 State St., Albany, N. Y.

Southern Center

FOR LABORATORY APPARATUS AND CHEMICALS

We carry in stock complete equipment for Water Works or Sewerage Laboratories. Ask for literature.

PHIPPS and BIRD, Inc.

RICHMOND, VA.

SINCE 1866

●

THE LUDLOW VALVE MFG. CO., INC.

TROY, N. Y.

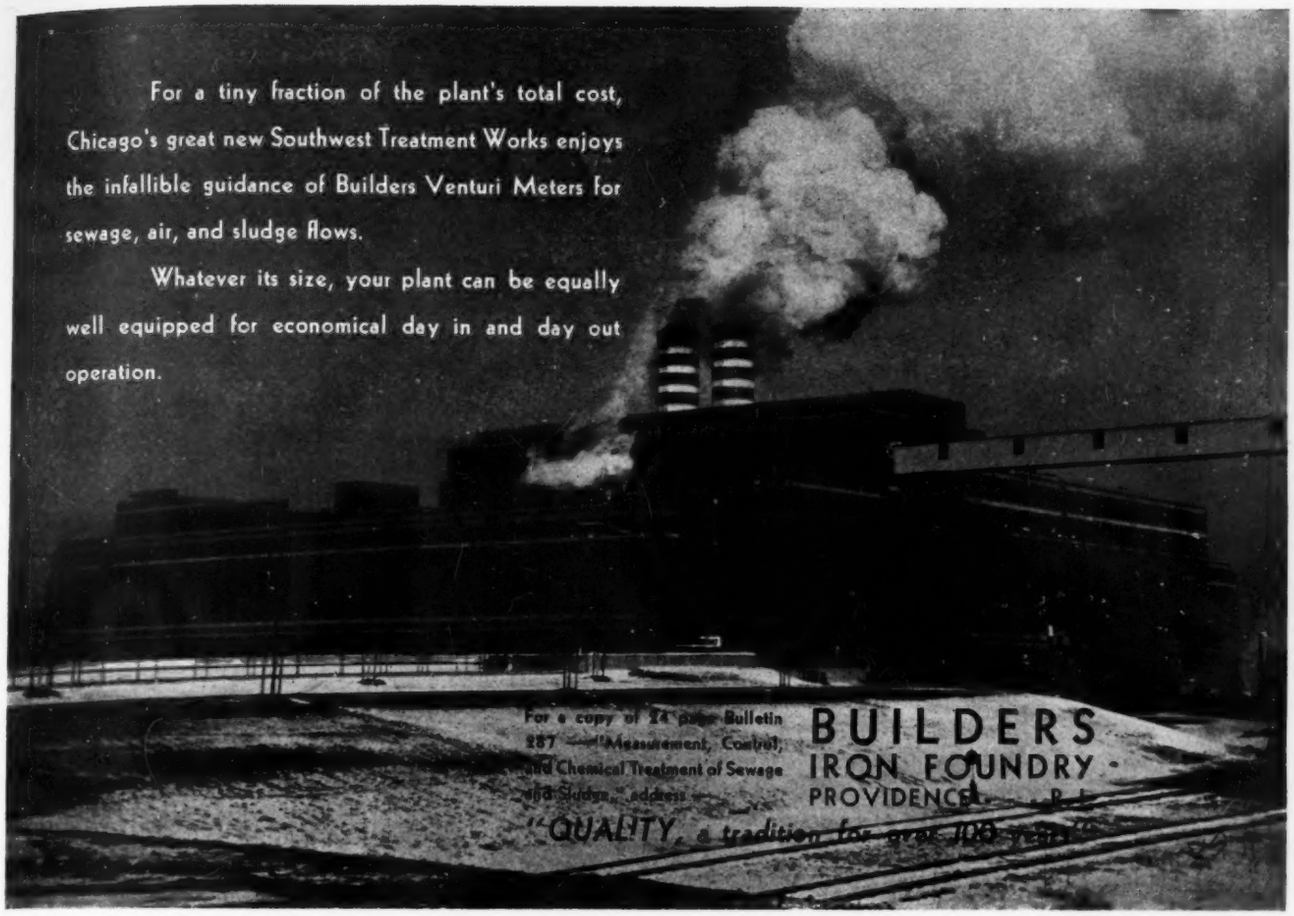
Available Today

With reputation for doing outstanding creative work in Sales, Advertising, Business Management and Sales Promotion—With over fifteen years of valuable marketing and sales management experience in water works and sewage equipment fields and with advertising agencies—Responsible for building profitable sales, covering every type of sales operation, plus keen understanding of how to get things done effectively and economically. West Point trained. Married. Character and integrity beyond reproach. Ideal executive assistant or department head. Address Box 36, Water Works & Sewerage, 330 So. Wells St., Chicago, Ill.

USED TRENCHER FOR SALE OR RENT

Have P&H ladder-type trencher with standard extension. Digs 22" trench, 7' deep. Equipped with Waukesha 55 h.p. gas engine. Good operating condition. Will sacrifice for quick sale. Only $2500. Write Box No. 38, Water Works and Sewerage, 330 So. Wells St., Chicago, Ill.

SO YOU'RE GOING TO ST. LOUIS! STAY AT
Hotel Lennox
IT'S RIGHT DOWNTOWN. GOOD PARKING... AND MAN, WHAT SERVICE!
ALL ROOMS WITH BATH—RADIO RECEPTION


For a tiny fraction of the plant's total cost, Chicago's great new Southwest Treatment Works enjoys the infallible guidance of Builders Venturi Meters for sewage, air, and sludge flows.
Whatever its size, your plant can be equally well equipped for economical day in and day out operation.
For a copy of 24 page Bulletin 287 — "Measurement, Control, and Chemical Treatment of Sewage and Sludge," address —
BUILDERS
IRON FOUNDRY
PROVIDENCE
"QUALITY, a tradition for over 100 years"

Controlling Float Valve

Simplicity of Design, Construction and Operation Feature These Valves

● Controlling Float Valve is ideal for heaters, vats, tanks, etc. Valve entirely self-contained and operates without water spill. Sensitive in operation and indestructible due to air and water cushioning and heavy bronze mountings. Sizes to 24".

● Altitude Valve assures perfect water-level control in tanks, standpipes and reservoirs. Always function without any water surge or shock due to efficient air and water cushioning. Furnished with automatic, electric and manual control, and for single or double-action service.

DEPENDABILITY

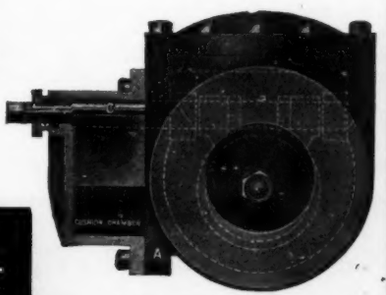
● Float Control Valve for high or low pressure service which can function on any desired water level variation desired. No water hammer or shock due to air and water cushioning. Furnished in angle or globe patterns ½" to 24" sizes in bronze, iron body or steel. No metal contacts assure lifetime service.

● Cushioned Swing Check Valve is nonslam due to perfect cushioning chamber. Minimum friction loss through valve and soon pays in power cost savings. Furnished in all sizes 4" and larger for all service conditions and pressures. Easily equipped with lever for manual control.

Over 30 years' experience is back of these valves.

Float Valve

Altitude Valve

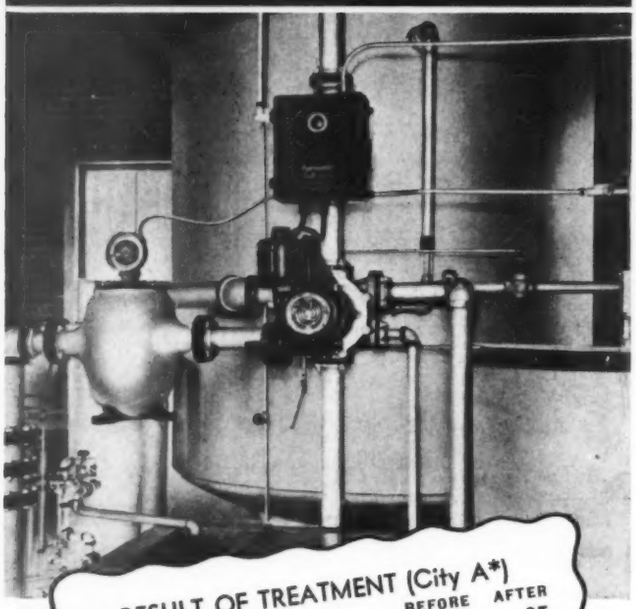


Swing Check Valve

GOLDEN-ANDERSON VALVE SPEC CO.
1329 FULTON BLDG.
PITTSBURGH PENNA.

One City tells another about

LOW-COST WATER TREATMENT



RESULT OF TREATMENT (City A*)

	BEFORE	AFTER
Total Hardness as $CaCO_3$	246	85
Alkalinity (M.O.) as $CaCO_3$	228	254
(Phenol) as $CaCO_3$	0	10
Free CO_2 as CO_2	13	0
Iron as Fe	0.2	0.1

AT first there was objection to a new water works plant—lots of it. But the objections were overruled, Permutit was installed—then the opposition melted. Why? Just look at those results! A hard water was made soft, its corrosive impurities were eliminated and troublesome iron was reduced to a minimum. *And at a cost of treatment of only* 1.4c *per thousand gallons!* This was certainly good news for City A and like all good news it traveled fast. Soon City B began to investigate—of course Permutit was recommended — and in a short time City B had a Permutit plant of its own.

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*City A obtained the results listed with Permutit Zeolite Water Softener. Names of cities on request.

PERMUTIT WATER CONDITIONING HEADQUARTERS

MEETINGS SCHEDULED

Mar. 18-20—BIRMINGHAM, ALA. (Thomas Jefferson Hotel)
Southeastern Section A.W.W.A. Sec.-Treas., B. P. Rice, Room 425, State Office Bldg., Columbia, S. C.

Mar. 20-22—TRENTON, N. J. (Hotel Stacey Trent)
New Jersey Sewage Works Association, (Silver Anniversary). Sec.-Treas., Paul Molitor, Jr., P. O. Box 374, Morristown, N. J.

Mar. 21—BOSTON, MASS. (Statler Hotel)
New England Water Works Association. Secretary, Frank J. Gifford, Statler Bldg., Boston, Mass.

Mar. 21-23—COLUMBIA, MO. (University of Missouri)
Missouri Water Works Operators' Short Course. Dean H. A. Curtis, College of Engineering, Columbia, Mo.

Mar. 27-29—LONDON, ONT. (Hotel London)
Canadian Section A.W.W.A. Secretary, A. E. Berry, Ontario Dept. of Health, Toronto, Ont.

Apr. 0-0—EAST LANSING, MICH. (Michigan State College)
Michigan Sewage Works Association. Sec.-Treas., W. F. Shephard, State Dept. of Health, Lansing, Mich.

Apr. 4-5—WEST LAFAYETTE, IND. (Purdue University)
Indiana Section A.W.W.A. Secretary, H. G. Horstman, 603 Traction Bldg., Indianapolis, Ind.

Apr. 5-6—MILES CITY, MONT. (New Milligan Hotel)
Montana Section A.W.W.A. Secretary, H. B. Foote, State Board of Health, Helena, Mont.

Apr. 8-9—SANTA CATALINA ISLAND, CALIF.
California Sewage Works Association. Secretary, Wm. T. Ingram, Box 111, Stockton, Calif.

Apr. 10—AUGUSTA, MAINE
Maine Water Utilities Association. Sec.-Treas., Earle A. Tarr, Winthrop, Me.

Apr. 14-17—KANSAS CITY, MO. (Hotel Continental)
American Society of Civil Engineers. Secretary, Geo. T. Seabury, 33 West 39th St., New York City.

Apr. 15-17—FAYETTEVILLE, ARK. (Engineering Hall, Univ. of Arkansas)
Arkansas Water & Sewage Conference. Secretary, Harrison Hale, 114 Chemist Bldg., Fayetteville, Ark.

Apr. 16—MIDDLETOWN, CONN. (Higgins' Inn & Restaurant)
New England Sewage Works Association. Sec.-Treas., LeRoy W. Van Kleeck, State Dept. Health, Hartford, Conn.

Apr. 21-25—KANSAS CITY, MO. (Headquarters Hotels—The Phillips, The President and The Muehlebach)
American Water Works Association Annual Convention. Secretary, Harry E. Jordan, 22 East 40th St., New York City, N. Y.

May 8—PORTLAND, ORE. (Portland Hotel)
Pacific Northwest Sewage Works Ass'n. (Annual Meeting) Sec.-Treas. Fred Merryfield, Oregon State College, Corvallis.

May 9-11—PORTLAND, ORE. (Portland Hotel)
Pacific Northwest Section A.W.W.A. Secretary, Fred Merryfield, Oregon State College, Corvallis, Oregon.

May 9-10—AKRON, OHIO (Mayflower Hotel)
Ohio Section A.W.W.A. Secretary, T. R. Lathrop, State Dept. of Health, Columbus, Ohio.

May 16-17—SALISBURY, MD. (Wicomico Hotel)
Maryland-Delaware Water & Sewerage Associations. Secretary, A. W. Blohm, 2411 North Charles St., Baltimore, Md.

May 16-18—JACKSONVILLE, FLA.
Florida Section A.W.W.A. Secretary, A. P. Black, University of Florida, Gainesville, Fla.

May 22-24—CHICAGO, ILL. (Congress Hotel)
Illinois Section A.W.W.A. Secretary, H. E. Hudson, Jr., 6843 Oglesby Ave., Chicago, Ill.

May 16-17—SALISBURY, MD. (Wicomico Hotel)
Maryland-Delaware Water & Sewerage Association. Secretary, A. W. Blohm, 2411 North Charles St., Baltimore, Md.

June 6-7—ITHACA, N. Y. (Hotel Ithaca)
New York Section A.W.W.A. (Spring Meeting). Secretary, R. K. Blanchard, 50 West 50th St., New York, N. Y.

June 12—POLAND SPRING, ME.
Maine Water Utilities Association. Sec.-Treas., Earle A. Tarr, Winthrop, Me.

June 20-22—SYRACUSE, N. Y. (Hotel Syracuse)
New York State Sewage Works Association. Sec.-Treas., A. S. Bedell, State Dept. of Health, Albany, N. Y.

June 24-28—ATLANTIC CITY, N. J. (Chalfonte-Haddon Hall)
Sec.-Treas., C. L. Warwick, 260 So. Broad St., Philadelphia, Pa.

June 24-26—STATE COLLEGE, PA. (Nittany Lion Inn & Dormitories)
Pennsylvania Water Works Operators' Association. Annual Convention. Sec.-Treas., I. M. Glace, Consulting Engineer, 22 So. 22nd St., Harrisburg, Pa.

June 26-28—STATE COLLEGE, PA. (Nittany Lion Inn & Dormitories)
Pennsylvania Sewage Works Association. Sec.-Treas., L. D. Matter, Distr. Engr., Kirby Health Center, Wilkes Barre, Pa.

Aug. 14—BOOTHBAY HARBOR, MAINE
Maine Water Utilities Association. Sec.Treas., Earle A. Tarr, Winthrop, Me. (Future Meetings Scheduled—Oct. 9—Millinocket; Dec. 12—Mexico).

Sept. 11-13—ANN ARBOR, MICH. (Univ. of Michigan Union)
Michigan Conference on Water Purification. Sec.-Treas., R. J. Faust, Michigan Dept. Health, Saginaw, Mich.
(Meeting Jointly with)
Michigan Section A.W.W.A. Sec.-Treas., M. N. Gerardy, 803 Water Board Bldg., Detroit, Mich.

Sept. 16-17—DENVER, COLO.
Rocky Mountain Section A. W. W. A. Secretary, R. V. Howe, State Office Bldg., Denver, Colo.

Sept. 18-20—NEW CASTLE, PA. (Castleton Hotel)
Western Pennsylvania Section A.W.W.A. Sec.-Treas., E. P. Johnson, 418 Flannery Bldg., Pittsburgh, Pa.

Sept. 24-27—NEW YORK, N. Y. (Commodore Hotel)
New England Water Works Association. (59th Annual Convention). Secretary, Frank J. Gifford, 613 Statler Bldg., Boston, Mass.

Oct. 8-11—DETROIT, MICH.
American Public Works Association. Exec. Dir., Frank W. Herring, 1313 E. 60th St., Chicago, Ill.

Oct. 14-17—TULSA, OKLA.
Southwest Section A.W.W.A. Secretary, Lewis A. Quigley, 3320 W. Berry Street, Fort Worth, Texas.

Oct. 16-18—ATLANTIC CITY, N. Y. (Haddon Hall)
Pennsylvania Water Works Association. (45th Annual Meeting.) Secretary, F. Herbert Snow, 507 Telegraph Bldg., Harrisburg, Pa.

Oct. 18-19—ATLANTIC CITY, N. J.
New Jersey Section A.W.W.A. Sec.-Treas., C. B. Tygert, Box 178, Newark, N. J.

Oct. 21-23—LEXINGTON, KENTUCKY (Hotel Lafayette)
Kentucky-Tennessee Section A.W.W.A. Sec.-Treas., H. D. Schmidt, State Dept. of Health, Nashville, Tenn.

Oct. 23-26—LOS ANGELES, CALIF. (Los Angeles-Biltmore Hotel)
California Section A.W.W.A. Secretary, Burton S. Grant, 207 So. Broadway, Los Angeles, Calif.

Nov. 7-8—ST. PAUL, MINN. (Hotel St. Paul)
Minnesota Section A.W.W.A. Sec.-Treas., R. M. Finch, W. & T. Co., 416 Flour Exchange, Minneapolis, Minn.

LITERATURE AND CATALOGS

"Scru-Peller" Sludge Pumps are the subject of a bulletin received from Chicago Pump Co., which presents the latest engineering data and performance curves on the unique "Scru-Peller" pumps, especially designed for pumping sewage sludge containing coarse solids (primary sludge) or industrial sludges of like nature. New information in this bulletin is of value in selecting the most appropriate style pump for the job at hand. The information has the especial value of being based on experience in using these unique pumps, which are centrifugal pumps positively fed by a pressure screw-feed device equipped with cutting bars. Coarse solids, rags, etc., are sheared during travel through the screw feed. Typi-

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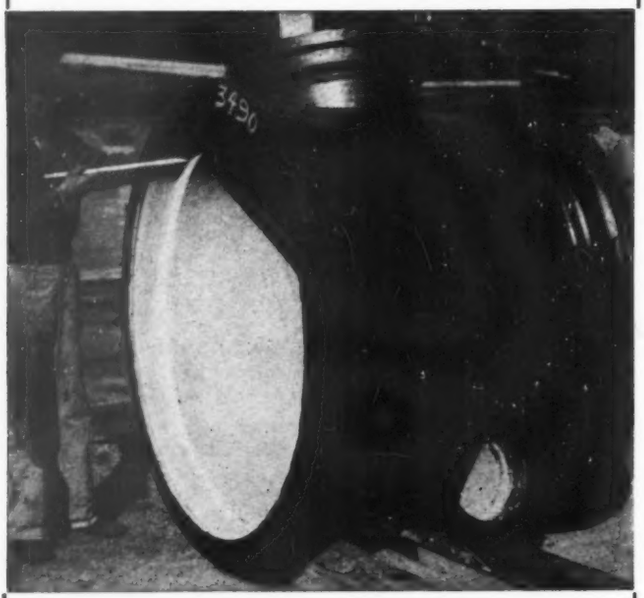

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cal units supplied various sewage plants are pictured. Details of design and principles of operation are given with the aid of cut-away views. Chicago Self-Primers for centrifugals are also described, and an impressive list of users of "Scru-Peller" pumps appears at the end. For a copy of Bulletin No. 190 write Chicago Pump Co., 2336 Wolfram St., Chicago, Ill.

"A Brass-Pipe Handbook"—has just been published by the Copper and Brass Research Assn. It is the worthy production of T. N. Thompson, an authority who is known for his other reference works in his field. The new Brass-Pipe Handbook, of 8½" x 11" handy file size, contains 60 pages of useful information, data, and typical interior piping layouts according to the best modern practices. After a discussion of the selection of suitable pipe (brass, copper, red-brass, etc.) for specific types of water and service conditions, amongst the chapters which follow are those dealing with: "Pipe Tools and Their Use"—(cutting, threading, reaming, jointing, bending, etc.); "Methods of Installation"; "Design Data"—(selection of correct pipe sizes for various services, friction allowances, capacities, etc.); "Layout of Installations"—(starting from the street-main and running through to the faucets in small and large buildings). At the end appears complete brass and copper pipe specifications and several pages of plans of water piping and heating systems. For a copy of this useful handbook, write Copper and Brass Research Assn., 420 Lexington Ave., New York City.

"BOXES—Service, Valve, etc." are presented in a new catalog from The Central Foundry Company, manufacturers of Universal Cast Iron Pipes and other cast-iron water supply equipment. Featured is the new "Monitor" Service Box with the patented "Stay-On" cover, which fits flush with the top of the frame and is fastened in place by a small round locking plate held by a rugged brass screw, the design making for safety and security. The "Monitors" are pictured in sliding and screw types for height adjustment. Then are presented frost-proof Valve Boxes and Roadway Boxes, with square or round heads. For a copy of Catalog B-40 write The Central Foundry Co., 386 Fourth Ave., New York City.

"Precision Feeders" by Omega are chemical solution feeders of the precision type, which operate on the principle of a gradually falling constant head feed-orifice, the rate of fall determining the rate of feed from the solution tank. The rate of fall is controlled by a geared motor and speed-changing mechanism, which permits lowering at various speeds to procure desired rates of feed. These feeders are illustrated and described in a new bulletin, which reveals their several typical applications by use of installation sketches. For a copy of "Omega Precision Feeders" write Omega Machine Company, 4010 Penn Ave., Kansas City, Mo.

"Electrical Measuring Instruments" from Leeds and Northrup Co. is a condensed 66 page General Catalog which presents the complete line of L. & N. electrical instruments employed in experimental work, routine testing, plant control, teaching, and research. This new catalog, representing the first comprehensive cataloging of such L. & N. instruments since 1907, with brief descriptions of each piece of equipment pictured, serves as an illustrated price list and index. Each of the items briefly described has a key number so that individual bulletins which describe each instrument and its applications in detail may be procured. In choosing instruments and accessories for specific work in laboratory, plant or field, instrument users will find this type of catalog a useful guide. For Catalog "E", write

Leeds and Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.

"Potentiometer Indicating Recording Controller," is a seven-page illustrated bulletin just issued by The Foxboro Co., which fully explains the mechanism and operating characteristics of this new instrument. Prominent among the new design features described in the sensing mechanism said to cause an appreciable change in pen position and control action on a pointer deflection of 1/10,000 of an inch. Other new features covered in the bulletin are the highly sensitive galvanometer, extensible mounting, accessibility, and unit construction. For bulletin No. 240, The Foxboro Co., Foxboro, Mass.

"Waterplug" and its application in stopping leakage through concrete or other masonry walls is the subject of a folder from Standard Dry Wall Products, Inc. "Waterplug" is described as a very fast setting cement (3 to 5 min. setting time) which allows a man to work up a ball of the material, slap it in the leak and hold it long enough for the quick set. On top of the "Waterplug" seal is later applied Standard's "Quickseal" or "Thoroseal" with brush, spray gun or trowel. "Waterplug" may be applied actually against streams of spurting water to stop such leaks, provided the porous contiguous masonry is first chipped away. For the folder giving full details concerning these three leak and moisture proofing materials, write Standard Dry Wall Products, Inc., West Elizabeth, Pa., or Sherwood Waterproofing Corp., 53 Park Place, New York City.

"Gas Burners" in great variety are presented in a new catalog from John Zink Co. of Tulsa. The catalog covers a complete line of gas burners for heating boilers, furnaces, incinerators, etc. Burners illustrated and described are available in a complete range of sizes for low pressure and high pressure burning of any kind of gas. A complete line of waste sewage-gas burners are included. For a copy of "Gas Burners," address John Zink Company, 4401 S. Peoria, Tulsa, Okla.

"Water Control Gates" by Rodney Hunt are the subject of a folder from this century old manufacturer of "Lifetime" Timber Gates for open channel water flow control in connection with hydraulic power developments, public water supply, irrigation, flood control, etc. "Lifetime" Timber Gates are built of timbers impregnated with an anti-decay compound which assures a 50 year life or more for the wooden parts. The folder also pictures and describes Rodney Hunt gates of all metal construction, geared floor stands, and geared hoists for operating gates, with as much as 40 ft. head on one side and none on the other. For the folder, write Rodney Hunt Machine Co., Orange, Mass.

"Wrong and Right" might well be the caption of an illustrated safety manual being distributed by Lumber Mutual Casualty Insurance Co. of New York. It presents in a very lucid manner the correct barricading of street and road openings for repair or new construction work and also incorrect and hazardous methods of barricading. Methods of adequately warning motorists and pedestrians are also presented. Only the short descriptions and explanations are required to amplify the very effective illustrations. A study of this manual by authorities in charge of water main and sewer construction, and by contractors and foremen, should do much to preclude street accidents and advance safety in street and road work. It represents the best thing of its sort that we have ever examined, and has been produced for gratis distribution. For copies, write Lumber Mutual Casualty Insurance Co., 41 East 42nd St., New York City.

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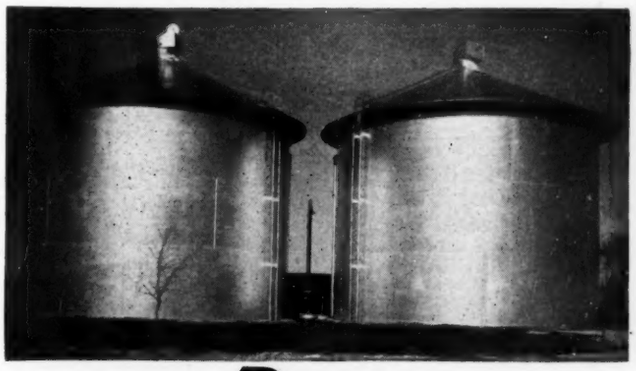

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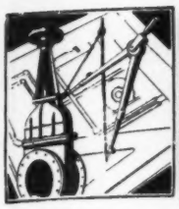

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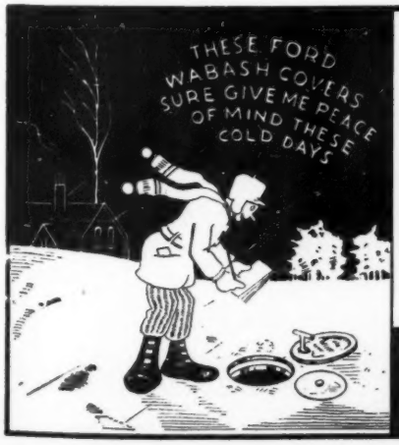

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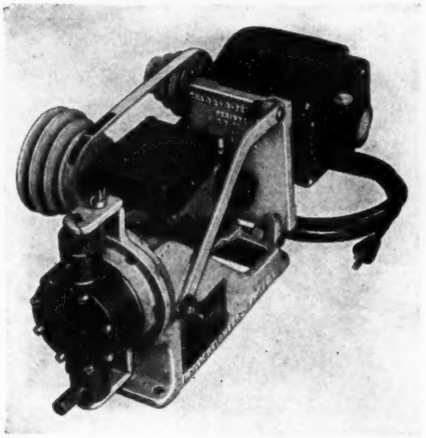
for Taste and Odor Control

The problem of taste and odor control is becoming increasingly acute and this past year several papers have been delivered at Association meetings on "Super-Chlorination and De-Chlorination." (We've dubbed it XSD Chlorination, to give it a handier name!)

% Proportioneers % are following this discussion with interest for our chemical feeders (either constant rate or flow proportional) are ideally suited for this chemical feeding job. One Chlor-O-Feeder feeds an excess quantity of safe hypo-chlorite solution—enough to "burn up" taste and odor producing impurities so that only a chlorinous taste and odor remains—and a second machine feeds sodium bisulphite solution in amounts sufficient to de-chlorinate as desired, leaving only the required residual chlorine, with no odor or taste.



Plants of a size requiring a gas chlorinator can use that equipment to feed the excess chlorine and then install a simple, inexpensive "de-Chlor-O-Feeder" to feed the sodium bisulphite; for these machines easily handle the quantity required for a plant of 25 to 30 m.g.d.

If interested, write us for XSD Chlorination information.

% PROPORTIONEERS, INC. %

Chemical Feeder Headquarters

9 N. Codding Street — PROVIDENCE, R. I.

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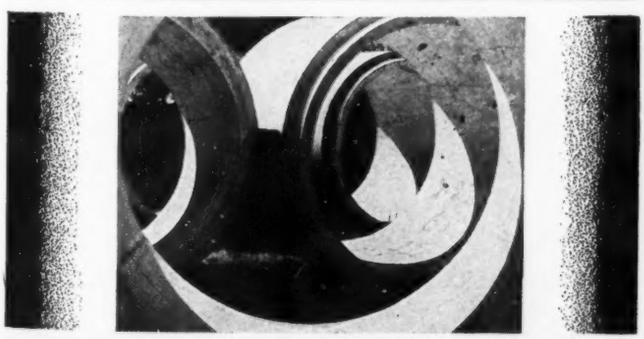

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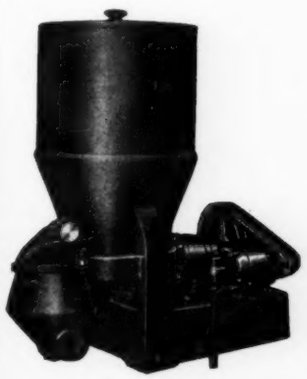
The Dry Chemical Feeder That's Built to Last

INFILCO Type D Dry Chemical Feeders are built to perform with their original accuracy and dependability year after year. Two have been in continuous service at Louisville, Ky., for 15 years—And more trouble-free years are ahead, too, for Infilco Feeders are *built* for long life.



Their exclusive principle of operation permits simplicity in design and durability in construction, contributing to long, dependable service.

ECONOMICAL

Long life, without costly repairs and replacements, means *economical* operation. It pays to buy Infilco Type D Feeders for long-time economy.

Write for Bulletin 205-A.

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INFILCO

ADVERTISERS

The Dash (—) Denotes Current Advertisers Who Do Not Appear in This Issue

A

Activated Alum Corp. 74
Albright & Friel, Inc. 82
Alvord, Burdick & Howson 82
American Cast Iron Pipe Co. 80
American Water Works Association .. 6-7
*Armco Drainage Products Co. ..... —
Arrowhead Iron Works, Inc. 76
Asphalt Products Co., Inc. ..... —
Atlas Mineral Products Co. of Pa. 74

B

Bacharach & Co., E. W. 86
Badger Meter Mfg. Co. 12
*Bailey Meter Co. 73
Black & Veatch 82
*Brainard & Co., F. S. 76
Buck, Seifert and Jost 82
*Builders Iron Foundry 77
Burns & McDonnell Engr. Co. 82

C

*Calgon, Inc. 13
*Carborundum Company, The ..... —
*Carson-Cadillac Corporation ..... —
Cast Iron Pipe Research Assoc., The 16-124B-124C
Chain Belt Co. ..... —
Chester Engrs., The 82
*Chicago Bridge & Iron Company 8
*Chicago Pump Company ..... —
Clark Controller Co., The 3
Cochrane Corp. ..... —
Columbian Iron Works 84
Crane Co. 10

D

Darco Corporation 69
Diamond Alkali Company 11
Dorr Company, Inc., The ....Third Cover
*Dow Chemical Company, The 81

E

Edson Corporation, The 74
Eimco Corporation, The ..... —
Electro Bleaching Gas Co. ..... —
*Electro Rust Proofing Co. ..... —

F

*Ford Meter Box Co. 83
Fulton, Edward A. 82

G

Gardner-Denver Company ..... —
Gascoigne & Associates 82
*General Paint Corporation ..... —
*Golden-Anderson Valve Spec. Co. 77
Graver Tank & Mfg. Co. ..... —
Greeley & Hansen 82

H

*Hill, Hubbell & Co. ..... —
*Hydraulic Development Corp. 84

I

*Industrial Chemical Sales 124A
Innis, Speiden & Co. 75
*International Filter Co. 85
Iowa Valve Company ..... —

J

*Johns-Manville 4-5-134A-79

K

Knowles, Inc., Morris 82

L

Lancaster Research Laboratories 82
Leadite Company, The 74
Lennox Hotel 76
Lock Joint Pipe Co. 85
Ludlow Valve Mfg. Co., Inc., The 76

M

Mabbs Hydraulic Packing Co. 76
Mathews Hydrants 14
Mathieson Alkali Works, Inc., The ... 15
Metcalf & Eddy 82
Mueller Co. 84

N

*National Water Main Cleaning Co. 84
Neptune Meter Co. 18
Newsom, Reeves 82
Nichols Engineering & Research Corp. 134B
Nussbaumer & Clarke, Inc. 82

O

Ozark Chemical Company ..... —

P

*Pacific Flush Tank Company ..... —
*Pennsylvania Salt Mfg. Company 9
Permutit Company, The 78
Petersen Hydraulic Flusher Co. ..... —
Phipps & Bird, Inc. 76
Pirnie, Malcolm 82
*Pitometer Company, The 82
*Pittsburgh-Des Moines Steel Co. 81
Pollard Co., Inc., Joseph G. 85
Potter, Alexander 82
Portland Cement Association 124D
*Proportioneers, Inc. 85

R

Raisch, William 82
Rawlins, George S. 83
Reilly Tar & Chemical Corporation ... 70
Riddick, Thomas M. 83
Roberts Filter Mfg. Co. 83
Royer Foundry & Machine Co. 71
Russell and Axon 83

S

*Simplex Valve & Meter Co. 84
Standard Silicate Division ..... —
Stanley Co., Inc., William W. ..... —
Stewart, W. H. 74

T

Tapax Mfg. Co., Inc. 76
Tennessee Corporation 83
Thomson Meter Company 18
*Turbine Sewer Machine Co. 84

U

Underpinning & Foundation Co., Inc. .. —
*U. S. Pipe & Foundry Co. ..Second Cover

W

*Wallace & Tiernan Co., Inc. ..Back Cover
Warren Foundry & Pipe Corp. 72
Water Leak Detector Co. 75-83
Weston, L. A. 74
Weston and Sampson 83
Whitman and Howard 83
Whitman, Requardt & Smith 83
Wilkens-Anderson Co. 80
Wood Company, R. D. 14

* Advertisers with * were represented in the May, 1939, Convention and Data Edition with catalog specification copy. Please refer to that issue for additional information on any of their products.

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Water Purification PLANTS

Dry Chemical Feeders
Swimming Pool Filters

Consult us any time — no obligations

E. W. BACHARACH & CO.

Rialto Bldg., Kansas City, Mo.

Watch for the *April* Issue

of

WATER WORKS & SEWERAGE

(The Annual Convention and Reference and Data Edition)

It will be distributed at the

AMERICAN WATER WORKS ASSOCIATION CONVENTION

April 21-25, 1940, at

KANSAS CITY, MO.

at Ypsilanti DORRCO CLARIFLOCCULATORS

show

31.6% MORE CAPACITY

or

21.6% GREATER REMOVALS

The Dorrco Clariflocculator—a combination of a central Flocculator compartment and an outer, annular clarification compartment—is a long step forward in sedimentation practice. Because it mechanically (without chemicals) preconditions the raw feed for more rapid and efficient sedimentation, it gives either greater capacity or higher removals compared with the normal type of sedimentation unit.

The table at the right contains operating data from Ypsilanti, Michigan—31.6% more capacity at same removals; 21.6% greater removals at same capacity. At the right is a list of installations made to date and a table of the fields where the Clariflocculator is directly applicable.

It will pay you to install a Dorrco Clariflocculator in existing overloaded plants. It will definitely step up plant capacity, percent removal or both.

DORRCO

● *A detailed paper on the Dorrco Clariflocculator with seven tables of data will gladly be sent on request.*

COMPARATIVE RESULTS AT YPSILANTI

40' Dorrco Clariflocculator vs. 40' Dorr Clarifier on weak domestic sewage:

	Greater Capacity at Same Removals (7 wks. average)		*Greater Removals at Same Capacity (8 wks. average)*	
	Clari-floccu-lator	Clari-fier	Clari-floccu-lator	Clari-fier
Detention—Hrs.	1.9	2.5	2.3	2.3
O'flow rate—gals./sq. ft./day	950	720	800	800
Raw Sewage—p. p. m.	147	147	155	155
Effluent—p. p. m.	68	71	66	82
Removals—percent	53.8	51.8	57.4	47.2
Increased capacity—percent	31.6	—	—	—
Increased removals—percent	—	—	21.6	—

Other tests, of shorter duration, indicate proportionately greater improvements on proportionately stronger sewages.

●

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CARMEL, CALIFORNIA
COVINA, CALIFORNIA
HILVERSUM, HOLLAND
LEBANON, TENNESSEE
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Coagulation
Softening

SEWAGE
Raw • Chemically precipitated
Trickling filter effluent

TRADE WASTES
Raw • Chemically precipitated

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DON'T WAIT

until history repeats itself

The Floods Came—

Wide World Photo

THE POYDRAS CREVASSE—24 HOURS AFTER CUTTING, MAY, 1927.

—Were You Ready?

DURING the recent calamitous flood, we were besieged with telegrams to ship chlorine control apparatus to the afflicted area to sterilize water supplies. We transferred many members of our staff to render assistance to the Red Cross and the Federal and State Health authorities. We did everything we could to prevent the spread of typhoid fever and other pestilential disease due to the pollution that entered water supplies because of the flood.

Many well water supplies, the pollution of which was considered impossible, had to be equipped with an emergency chlorinator in order to avoid the sure toll of disease that would follow the use of unchlorinated water.

The moral is plain:—Just as you carry fire insurance, not expecting a fire but guarding against the day that fire might come, so should every water supply be chlorinated regardless of its source.

Chlorination costs but one cent per capita per year. It is the cheapest public health insurance. And the time to provide for chlorination is before the emergency comes.

THIS STORY IS AS AP... TODAY AS IT WAS THE...

"The only safe water is a sterilized water"

WALLACE & TIERNAN

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Manufacturers of Chlorine Control Apparatus

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